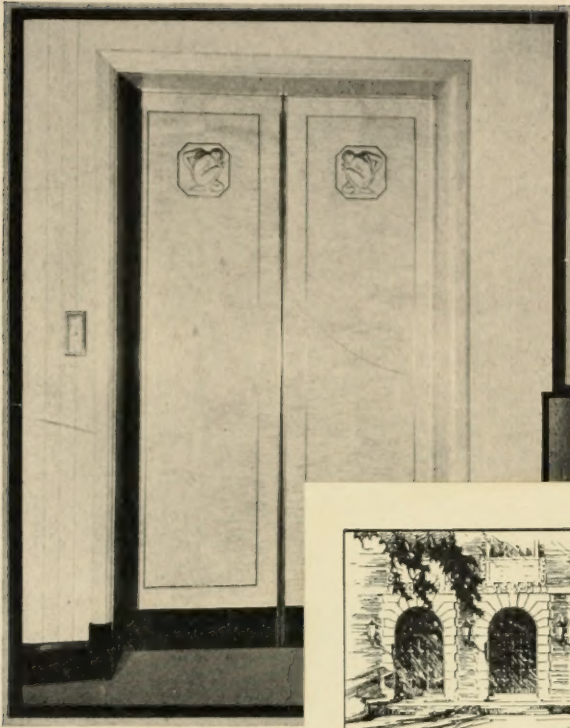


HANDBOOK FOR
ARCHITECTS AND BUILDERS

PUBLISHED
UNDER THE AUSPICES
OF THE

Illinois Society of Architects

VOLXXXII 1929



Saks Store, Chicago

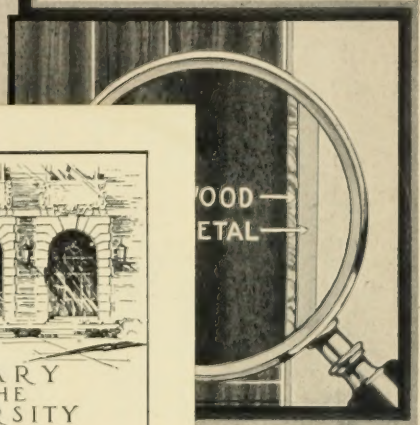
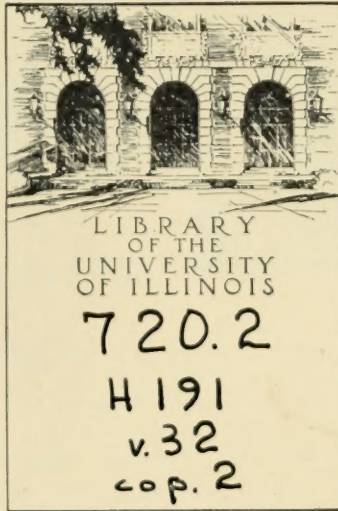
ME-TYL- (METAL-TYLER-V

THE elevator entrance possibilities of Me-Tyl



Mandel Brothers
Chicago, Illinois

*All the
beautiful
woods with
none of their
disadvantages*



unusually attractive
for elevator car and

ful woods are bonded
obtained by combining
dict metal and other

ood, the entire struc-
etal---only the visible
surface is of wood. Thus Me-Tyl-Wood affords all of the
beauty of wood with none of its weaknesses---it provides the
sturdy, rigid, fire-resisting qualities of all-metal construction,
with far greater artistic possibilities.

A selection of Me-Tyl-Wood designs in full color will be
mailed you on request---no obligation will be incurred.

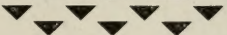
THE TYLER COMPANY, Cleveland, Ohio
Chicago Office: 310 South Michigan Avenue; Telephone, Harrison 8860

ELEVATOR
CARS


TYLER

ELEVATOR
ENTRANCES

FLOORING



The Most Used and Abused Portion of All Buildings



*When Selecting Flooring Look to the Responsibility
of the Manufacturer*

FRANKLIN R. MULLER, INC., established 1906.—Twenty-three years of progressive manufacturing experience, research and development—together with the integrity associated with the Muller name stand back of Muller Flooring.

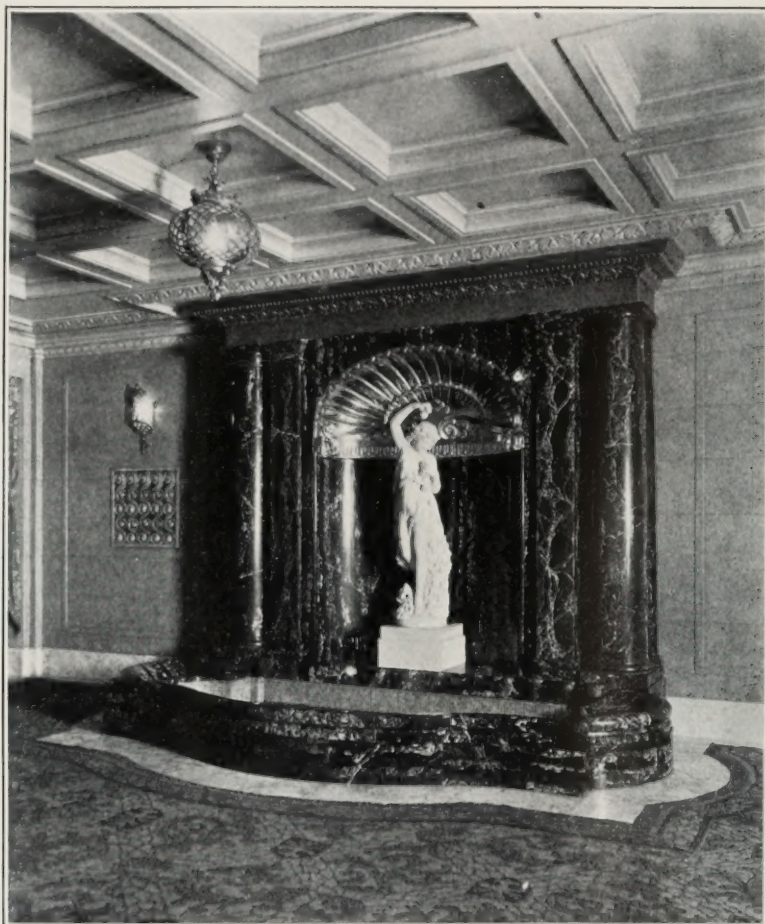
ASBESTONE Plastic Magnesia Flooring with its beautiful finish and large variety of artistic colors, resilient and easy to the tread properties contributes to the appearance and comfort of any building—is especially adapted for the flooring of schools, churches, hospitals, etc.—can be installed over either old or new wood or concrete underfloors.

SANA-BESTOS Asphaltic Rubber Tiles $\frac{1}{4}$ " thick, are practically wearproof, quiet, easy to the tread, non-slip, artistic, acid and water-proof—can be installed in one color or alternate colors, making it possible to have installations made in a large variety of designs—especially adapted for installation over concrete underfloors, in schools, churches, warehouses, factories, office and apartment buildings.

Prices, samples and full particulars free on application.

FRANKLYN R. MULLER, INC.

Flooring Manufacturers
WAUKEGAN, ILLINOIS



Black and Gold Marble Fountain
in Uptown Theater, Chicago, Ill.

C. W. and Geo. L. Rapp, Architects

PEERLING MARBLE COMPANY

Largest and Only Fully Equipped Marble Mill in Chicago

Manufacturers, Contractors and Dealers in

MARBLE

Telephone LAFAYETTE 9400

2891-97 Hillock Ave.

CHICAGO

HANDBOOK
FOR
ARCHITECTS AND BUILDERS



PUBLISHED
UNDER THE AUSPICES
OF THE
ILLINOIS SOCIETY OF ARCHITECTS



THIRTY-SECOND YEAR
1929



Emery Stanford Hall, Editor
Copyright 1929 by H. L. Palmer



PASSAVANT HOSPITAL
CHICAGO, ILL.

Holabird & Root, Architects, Chicago

FOR the convenience of all architects Wright Rubber Tile is illustrated in thirty colors, with complete data, in Sweet's Architectural Catalog. This same information is also available to you in handy, file size pamphlet form. We will cheerfully mail you this pamphlet without cost or obligation. Write Department A. H. B.

Wright Rubber Products Co.
Racine, Wisconsin

WRIGHT RUBBER TILE

H 191
V. 32
cop. 2

PREFACE

The thirty-second edition of the Handbook for Architects and Builders is again presented to the Architectural Profession. We have produced the work in its usual high standard and no time, effort or expense has been spared to give the Architect the information he requires in his daily practice.

The Handbook for Architects and Builders covers a peculiarly exclusive field and is a recognized reference work for everyone interested in Architecture. We have made but few changes from the general plan of arrangement that has proven satisfactory in former editions. Subject matter republished has been carefully revised and extended. The building ordinance has been corrected and all amendments passed within the last year have been placed in the sections affected. The special rulings of the Building Department have also been carefully checked.

The new building code, now in process of revision, is not available for publication at this time and we are advised by those in charge of the work that it may require at least six months or more to complete the work. However, should the building ordinance be completed before the anticipated time a supplement containing same will be sent to the users of the Handbook for Architects and Builders.

The staff of our contributors remains the same with the exception of Mr. Samuel R. Lewis who has written on the subject of Heating and Ventilation.

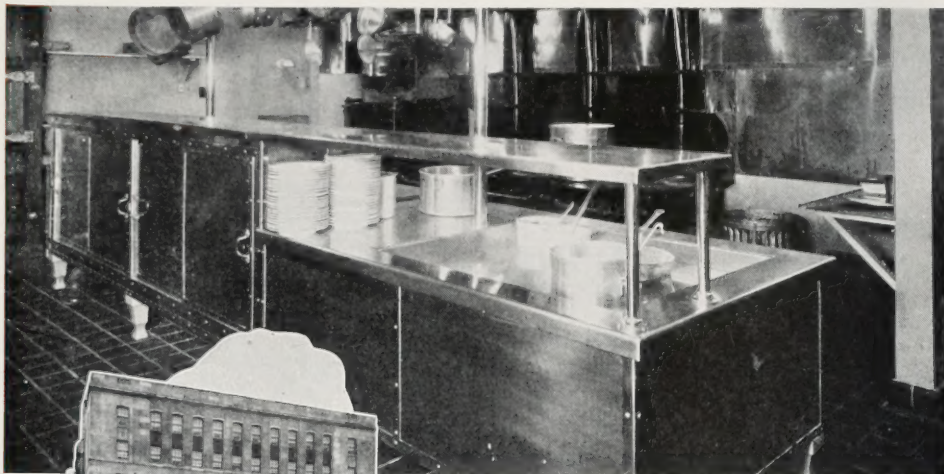
We realize, notwithstanding the care and caution which has been exercised in editing and preparing this volume, that inaccuracies may have found their way into this work and for such faults we ask our readers to forward to us their friendly criticism and constructive suggestions in order to improve succeeding editions.

The demand for the Handbook for Architects and Builders is constantly increasing and it has become almost indispensable to Architects, Engineers, Contractors, Builders, and those allied to the Building Industry.

The Classified Index which appears at the end of this volume furnishes the Architect with a list of those engaged in the manufacture and sale of materials and the contract business. We have exercised our best judgment in the selection of those represented in our advertising pages and we urge Architects, Engineers and Builders to use this list.

To our advertisers we extend our appreciation for their patronage.

AN UNUSUAL SERVICE BY VAN



Part of the Van Kitchen Equipment used in the new Chicago Woman's Club—one of the finest buildings of its kind. In making this installation it was our pleasure to co-operate with Holabird and Root, Architects, Chicago

Food service equipment—its problems, pitfalls and solutions—are authoritatively discussed in some interesting booklets prepared by Van especially for Architects. These are not catalogs, but reference works full of pictures, plans and data of value to anyone interested in food service. They are sent FREE:

Planning Restaurants That Make Money, 80 pages of sound, practical data.

Practical Planning of School Food Service, 32 page treatise on a difficult subject.

Food Service in Hospitals and Institutions. A 72 page booklet of value to every architect.

Food Service Planning in Clubs.

Food Service in Churches.

Kindly use your letter-head in requesting the booklets. No obligation is involved—and you will not be subjected to annoying follow-up.



The John Van Range Co.

EQUIPMENT FOR THE PREPARATION AND SERVING OF FOOD
Cincinnati

DIVISION OF ALBERT PICK-BARTH COMPANY, INC.

General Offices: Oakley, Cincinnati, Ohio

Chicago Sales Office
1200 West 35th Street

New York Sales Office
38 Cooper Square

¶ We call especial attention to the business announcements on these pages. We have accepted only such houses as are absolutely first-class and reliable. In the light of knowledge which we have upon the subject, acquired by experience, we feel that we have used every discretion in the matter of those represented herein



Performance Is the Final Test

JOHNS-MANVILLE Asbestos Built-Up Roofing Gives Lasting Satisfaction

The best built-up roofing cannot be selected solely on appearance. Nor can it be chosen on the probability of its permanence.

It must be permanent. And it must assure a permanence which will give absolute safety and economy. It must have staying power against fire and weather alike. And to this end it must render service with little or no maintenance cost.

Johns-Manville Asbestos Built-Up Roofing is the ideal built-up roofing because it assures such permanence. Composed of layers of rot-proof and fire-proof asbestos felts, impregnated with asphalt, it offers the utmost in smooth surface, fire and weather protection and durability. And it is economical, as it offers the maximum service without future expense.

In all parts of the country on buildings of every variety, Johns-Manville Asbestos Built-up Roofing has established a record of consistently fine performance. And performance is the final test.

Johns-Manville
CORPORATION

230 N. Michigan Ave.

Chicago, Ill.



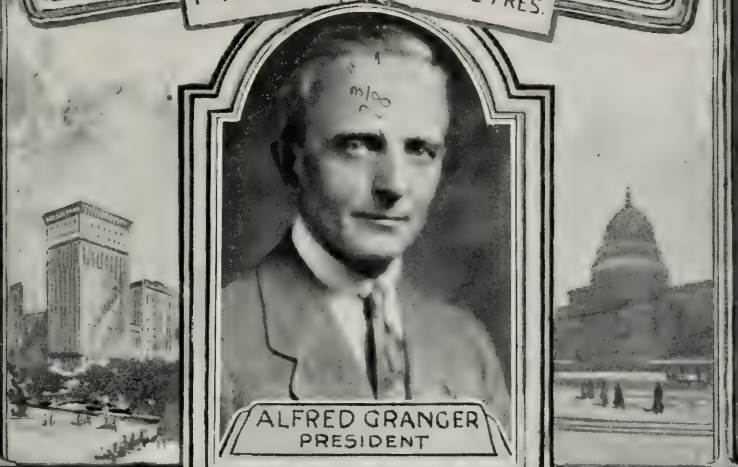
WILLIAM P. FOX

1ST VICE PRES.



GEO. B. HELMLE

2ND VICE PRES.



ALFRED GRANGER
PRESIDENT



R.C. OSTERGREN

TREAS.



WALTER A. MCDUGALL

SECY.

OFFICERS

Rich Ornament with Dignity at Moderate Cost

When you specify Northwestern Terra Cotta you can obtain the advantages of rich ornamentation for the exterior of your building, as well as for the interior, at a cost considerably lower than would otherwise be possible. It also can be used economically in connection with other materials.



THE NORTHWESTERN TERRA COTTA
COMPANY

DENVER

CHICAGO

ST. LOUIS



BYRON H. JILLSON



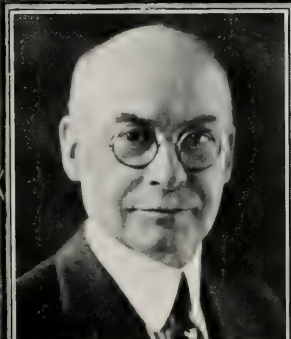
F. E. DAVIDSON



EMERY S. HALL



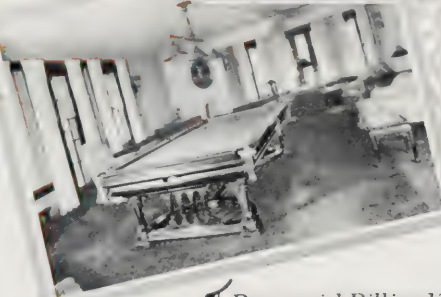
HOWARD J. WHITE



H. B. WHEELOCK



LEON E. STANHOPE



*Brunswick Billiard Tables for the home
are custom-built to harmonize with
any scheme of interior decoration*

A Billiard Room

Is Included in Every Well appointed Home

WITH home owners, fraternal organizations, church societies and clubs having learned the social possibilities and salutary effects of recreation, the custom of including facilities for play-enjoyment within residences and exclusive clubs is becoming general. Architects of repute are now recognizing this trend by including billiard

rooms in their plans for new residences and other community buildings.

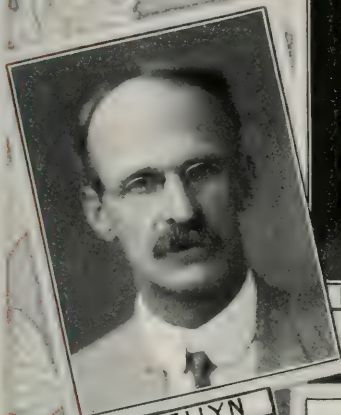
The Brunswick-Balke-Collender Company, manufacturers of billiard tables for more than three-quarters of a century, will deem it a privilege to assist architects in preparing plans for rooms of this kind—without, of course, any obligation whatsoever.

THE BRUNSWICK-BALKE-COLLENDER CO.

*Branch Houses in the Principal Cities
of the United States and Canada*

General Offices: 623 SOUTH WABASH AVENUE

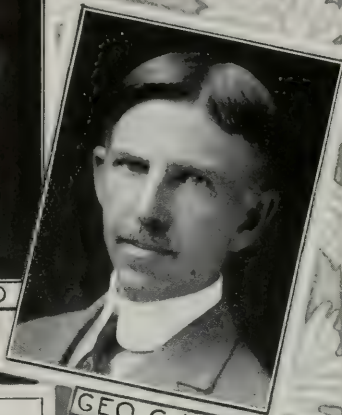
CHICAGO



J.C. LLEWELLYN



IRVING K. POND



GEO. C. NIMMONS



WANK A. CARPENTER



RICHARD E. SCHMIDT



N. MAX DUNNING



ELMER C. JENSEN

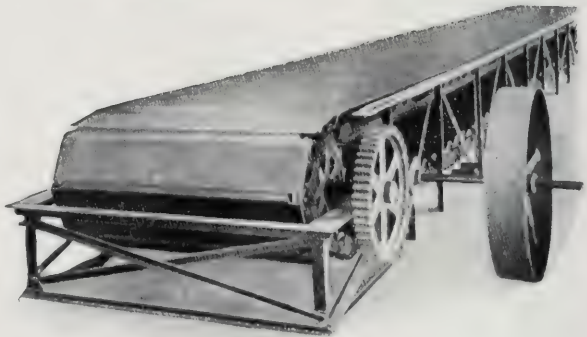
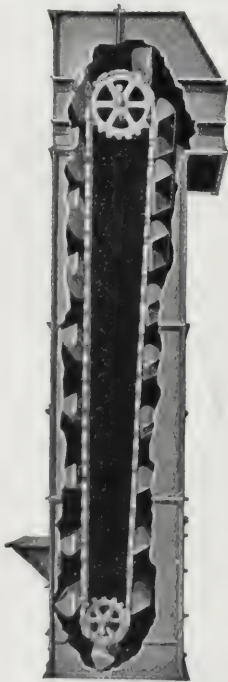
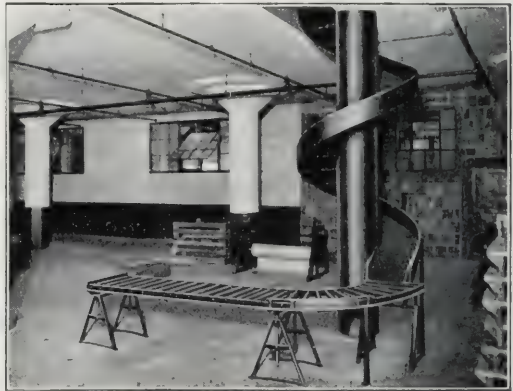
BOARD OF ARBITRATION

PNEUMATIC TUBE SYSTEMS AND CONVEYING EQUIPMENT

FOR ALL PURPOSES

Belt Conveyors
Gravity Conveyors
Apron Conveyors
Spiral Chutes
Subveyors
Automatic Elevators

Matter of fact we manufacture equipment
to handle any type of commodity



SAMUEL OLSON & COMPANY, Inc.,
1238-48 N. Kostner Ave., CHICAGO

Rialto Building
SAN FRANCISCO

5th Avenue Building
NEW YORK



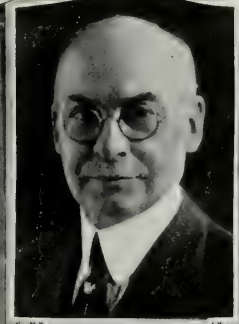
WALTER A. McDOUGALL
CHICAGO



MEYER J. STURM
EVANSTON



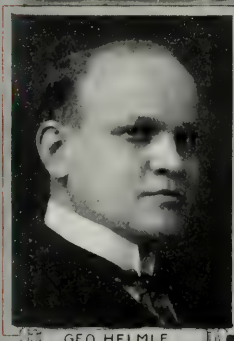
ALBERT P. DIPPOLD
CHICAGO



HARRY B. WHEELOCK
CHICAGO



ALBERT M. SAXE
CHICAGO



GEO. HELMLE
SPRINGFIELD



WM. H. SCHULZKE
MOLINE



ROBT. S. DEGOLYER
CHICAGO

COMMITTEE
ON
PUBLIC ACTION

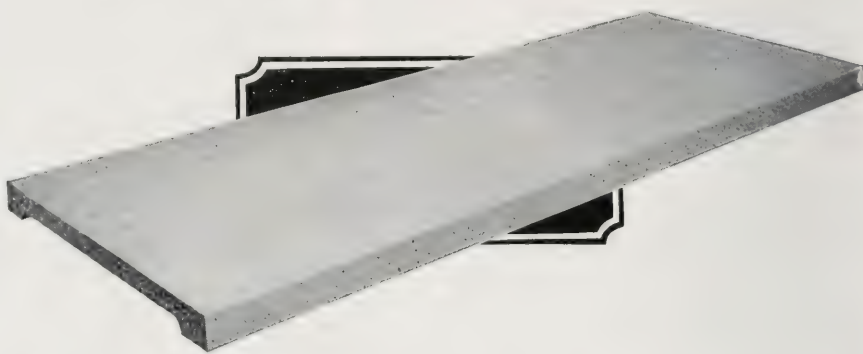


FRANK A. CARPENTER
ROCKFORD



HERBERT HEWITT
PEORIA

The Latest Advance in ROOF DECKS



Featherweight Concrete INSULATING ROOF SLABS

Haydite—the light weight aggregate used instead of sand—has made possible this startling development in roof construction—a strong, concrete roof-deck weighing but 10 lbs. per sq. ft. and offering in addition excellent insulating value!

Featherweight Concrete Slabs have come from years of research. They have demonstrated their economies in structural steel—in fuel and radiation. Today these slabs are found over some of the country's best known industrial, railroad and public buildings—Oakland Motors, Chicago, Milwaukee & St. Paul R. R., International Harvester, Chrysler, Inland Steel—Chicago's new Planetarium and 124th Artillery Armory and Naval Armory, Shreveport Auditorium—and many others.

Weight

10

lbs. per sq. ft. in
spans to 6' 8".
(Slabs for longer
spans also avail-
able).

*Our new 36 page book describes this
product in detail—sent on request.*

Made, Laid & Guaranteed by

FEDERAL CEMENT TILE CO.

608 South Dearborn Street

Chicago

FOR OVER A QUARTER CENTURY



HERBERT HEWITT



JAMES M. WHITE



L.H. PROVINE

EXAMINING COMMITTEE
of ARCHITECTS
• STATE of ILLINOIS •



M. F. WALSH
DIRECTOR of
REGISTRATION & EDUCATION



EMERY S. HALL



R. C. OSTERGREN

Casualty Insurance at Cost

The Builders & Manufacturers

Mutual Casualty Company

1520 STATE BANK BUILDING
120 South La Salle Street
CHICAGO
DEARBORN 8976

DIRECTORS:

ANDREW LANQUIST, Chairman of Board

H. B. BARNARD, President
FREDERICK BULLEY, 1st Vice-Pres.
GEO. M. GETSCHOW, 2nd Vice-Pres.
J. W. SNYDER
J. P. MONAHAN
V. L. PAGE
J. B. NOELLE
A. E. COLEMAN
J. C. WUELLNER

C. G. FANNING, Treasurer
A. C. WARREN, Ass't Treasurer
O. C. HOLTZ, Secretary
D. W. KIMBALL
F. VOIGTMANN
M. E. KEIG
F. W. JUNGCLAUS
GUY MILLS
A. E. HORST

**ORGANIZED—OWNED—OPERATED
BY BUILDERS**

To Furnish:

First—Sound indemnity at its actual cost.

Second—Prompt and efficient service to employed and employers.

Third—Reduction in severity and number of accidents by co-operation.

ASSETS OVER
\$1,500,000.00

EDITORIAL

By **EMERY STANFORD HALL.**

AN UNDERTAKING.

For years we have found fault with the ignorance of our public. Adjectives have been but feeble means for the expression of our contempt; even etcetera and etcetera has failed us when we have tried to describe the ignorance of our public. They know not architecture, but do we know medicine? We are part of the doctor's contemptibly ignorant public. We need health education even as our doctor friends need art appreciation. We have neglected to fulfil our obligation to give of what the public has helped us to get.

We are now undertaking to tell the story of architectural service, to explain the fascination of perfect proportion, to expound the commercial value of correctly correlated plan and to set forth the advantage of expert judicial administration. We have suddenly tumbled to the fact that they cannot know unless they are taught, that they cannot teach unless they are sent, and that they will not be sent unless we will pay.

The Illinois Society of Architects is undertaking a campaign of education. To do so, it has been compelled to dig deep into its treasury. To it there must be large replenishment or the Society's efforts must soon stop. Let every one that owes the Society pay up and let every member be a booster.

As pedagogues we are trying ourselves out. We have neglected the job too long. We must hang our heads with shame when we contemplate what our profession has done in comparison with what other professions have done. We ought to have started earlier, but we did not. Starting at this late date, our campaign must be all the more vigorous.

A TRAITOR.

A traitor is a peculiar animal. His chief object in life is to gain the confidence of a man and then bite him when his back is turned.

A traitor in a profession is a "yes" man, a promiser of everything and a doer of nothing. People may be funny, even peculiar. They may not be even wise, in our estimation, but once bitten by a traitor dog, to the bitten one and his friends, all dogs are traitors; but not all dogs are traitors, in fact, most dogs are not, but what is a good dog going to do when he gets kicked by a man that has been bitten by a traitor dog?

One traitor in any profession can ruin the reputation of a hundred in that profession who are models of honesty and faithfulness. Comparisons may be odious, but they serve to drive home the facts as in no other way. One bad architect spoils a lot of people for an appreciation of good architecture.

Dishonesty, recklessness or incompetency in the practices of any individual casts discredit on the entire profession of which he is a part. No man can live alone professionally.

The Illinois Society of Architects is endeavoring to bring the public into an appreciation of the value of professional services of an Architect. This will be an effort wasted if there are traitors within its ranks, or even among those outside its membership who call themselves by the name "Architect." Let there be no traitors in the architectural profession. Let each member of that profession realize his responsibility for the welfare of his fellow practitioners. Let no act of an individual reflect on the good name of his profession.

WHY KICK?

As a rule the kicker kicks in an effort to distract attention from his own case. As a rule in any organization the men who habitually refuse to bear their share of service on committees are the ones that find the most fault with those that do carry on.

In an organization such as ours, of necessity, practically all of the work has to be done by committees. To properly man these committees is one of the biggest tasks that falls to the officers of the Society.

Every member owes it to his Society to find out what kind of work he is best fitted to do and then offer his services to the President. Faithful service on a Committee by every member of our Society would accomplish wonders for our profession and no undue load on any one person.

If you do something worth while, you will probably need to wear a pad to soften the impact of the kicks, but you can console yourself with the observation that what you did must have amounted to something or there would have been no kicks.

Some people's estimate of themselves is so low that they have to kick about others to keep their courage up. If these would only try doing something for their Society of

Tompkins-Kiel Marble Company

IMPORTERS AND WHOLESALE DEALERS IN

Marble, French Stones, Swedish and Norwegian Granites and Onyx

Among the very many prominent and notable buildings in this country in which our marbles are installed, we take great pride in referring to the recently completed State Bank of Chicago as being one of the finest.

We are prepared to meet the most exacting architectural specifications for both interior and exterior work.

Our facilities are at your disposal at all times. May we serve you?

REPRESENTATIVES FOR QUARRIES PRODUCING

Madre Veined Alabama Marble
Madre Cream Alabama Marble
American Cream White Lens
Batesville
Botticino (Zani Quarry)
Cenere Marble
Champville
Dunnville Stone
Famosa and Bongardt
Marbles
French Limestones

Kasota Stone
Napoleon Gray
Onyx { Rose Florentine
 { Argentine
 { Etna
 { Pedrara
Ridgway Flagstone
Rosato
St. Genevieve Golden Vein
St. Genevieve Rose
Swedish Black Granite

Norwegian Blue Pearl
Granite
Tavernelle (I.M.V. Quarry)
Travertines { Colorado
 { Roman
 { Siena
 { Yellow Antique
Verde Antique (Imported)
Westfield Green
York Fossil

And many other marbles too numerous to enumerate.

There is No Substitute for Marble



414 Wrigley Building, Chicago

MAIN OFFICE, 505 FIFTH AVENUE, NEW YORK CITY

Telephones, Murray Hill 7376-7377-7378-6315-6528

YARD, MILLS & WHARF, 3508-26 VERNON BLVD., L. I. CITY, N. Y.

BRANCHES

Chicago, 414 Wrigley Bldg.

Alabama, Sylacauga

San Francisco

Los Angeles

Knoxville

Carthage, Mo.

St. Louis, Mo.

which they could be proud they would not have time to kick.

A limited amount of professional committee work is a distinct benefit to every member of a profession, but when three-fourths of the members refuse appointment on committees and three-fourths of those that do accept appointment simply act as figure heads and never offer either any constructive ideas or practical service, then the men who do work on committees find the load of work breakingly burdensome. Add to this load the kicks from those that never lift, and the burden becomes grievous.

Don't kick—boosting is lots more fun. The best way to boost is to take hold and help with some committee.

AN OBLIGATION

A child in a community is an obligation of that community. It is part of the function of organized society to prepare its embryo citizenry to eventually take their proper civic responsibility.

A child is an asset or a liability to society depending on its possibility of physical and mental development and its potential promise of social service.

It is up to the community to make adequate mental and physical training available to every one of its young citizens. The community has to do this in order to serve itself. Bad or unintelligent citizenry means the dissolution of the state. This is particularly true where the form of government is either representative or democratic.

Training for life service to be most effective must be appropriate to natural qualifications. Such training should also be proportioned to society's needs for different kinds of service. There must be a proportionate supply of physicians to patients, lawyers to clients, laborers to labor to be performed, business men for required business service, etc. Many a life has been ruined by a preparation for a service for which there was no demand or by a preparation for a service inappropriate to the personal tastes and ability of the individual. It is axiomatic that the best and most joyful service is in the work in which one has natural endowment and which has been supplemented by training.

As we have frequently reiterated in former editorial comment, society may be roughly divided into three groups, business, labor and professional. The motivating power of business and labor is the accumulation of money, while the motivating power of the professions must be the solution of the various problems of life. The obligation of business to the community is to see that it is properly organized so that everyone that is able to work is provided with work and revenue sufficient to their needs. It is the obligation of labor that, provided with adequate living wage, it shall create real property value through its constructive work. It is the obligation of the

professions to work out the philosophy of relationship, the questions of mutual obligation, and to provide the necessary technical information for business development, intelligently devise means for the elimination of human suffering, to minister to human ills, to provide amusement for the leisure period, and to express spiritual aspiration. The professional group must work out the philosophy of law, know correct sanitary measures, and direct their application for the prevention of disease, supply curative treatment for disease, devise artistically expressive and comfortable housing, present pictures and sculptures emblematic of human idealism and work out the ideal philosophy of human relationship.

Effective work in every department of life must be adequately remunerated in order to insure happiness. For everything that is given there should be a corresponding return. Society has a right to expect a return for discharging its obligation to its young citizens in providing them with the necessities of life, appropriate instruction, and the required freedom from other duties to pursue that instruction. It is an obligation of each citizen educated for life's work to return that service.

The obligation of the architect is to serve the community to the end that every building project entrusted to his care shall be faithfully and competently devised so as to minister both to comfort and artistic expression. It is his duty to take an active interest in all community matters appertaining to building, zoning, city planning, landscape architecture, sculpture, painting, and kindred subjects in which the training which he has received from the community best equips him to serve.

OVERHEAD.

Overhead is with us always. Revenue or no revenue, overhead works on just the same. Overhead is not vain, you can "cut it dead" but it stays by you continually. Heap on it whatever insults you may, it is your inseparable companion through life. Even in death it is there as usual taking its toll.

Overhead is that inescapable accumulation of expense that cannot be directly charged to any particular job, but is essential to all. It is also that item of expense which we have when we have no jobs. Some people think they can escape it by ignoring it, but it is a sad day for them when they do. Like the "grim reaper" it still continues on.

What may not be avoided should be faced squarely and met without fear. No accounting system can be considered adequate that does not spread equitably on the cost of the various jobs, their proportionate share of overhead.

No man can live professionally that does not read and do systematic research work. This takes time, apparatus, library and travel expense. Since his jobs benefit by this expense, they should be taxed with their just share of same.



GUYON HOTEL, Chicago

Protected by a

Bird Paroid Built-Up Roof

For Flat Roofs or Saw Tooth Construction
Over Sheathing or Concrete

*Some prominent Chicago buildings protected by a Bird Paroid
Built-Up Roof or Bird Building Paper*

Wrigley Building
Strauss Building
Telephone Building Annex
Burnham Building
Mallers Building
Chicago Motor Bus Co.'s Garages
Inland Steel Co. (Merchant's Mill Bldg.)
Bernard Hotel
Wingert Bros. Pottery Co.

Illinois Central Station, 63rd St.
Reo Motor Truck Co.
Capitol Theatre
Evanston Trust & Savings Bank
East Side Hotel
Evanshire Hotel
American Linseed Co.
New Union Station
Guyon Hotel
Guyon Paradise Ballroom

"There is a Bird's Roof for every type of building"

East Walpole
Mass.

BIRD & SON, inc.

1472 W. 76th St.
Chicago

To fail to be a faithful student of one's craft is to lose the great joy of work and at the same time to be a traitor to one's client and, incidentally, one's fellow practitioners. The traitor may do funny things, but anomalous as it may seem, he is never a happy man. To get the joy out of work, one must carry the overhead of constant inquiry.

Rent, public utilities, telephone, light, clerical services and office supplies like research cannot be directly charged to particular jobs, but no office can be run without them. These should therefore be spread to the jobs by some appropriate method of proportioning.

Men who price the value of their services without due consideration of essential overhead, make their prices too low and so receive inadequate remuneration for their services. The inadequately remunerated servant is harassed by bills he cannot meet as well as a feeling of discontent, a mental state which cannot possibly produce the best that is in a man. Therefore, the client cannot afford not to bear his just portion of his Architect's overhead to the end that he may be most perfectly served. Prices for services made, without proper estimate of overhead, not only harm the maker but are detrimental to his fellow practitioners.

The chief cause of complaint on account of unfair competition is due to the fact that fees for service are so often fixed only with regard to actual directly chargeable time required for execution and without any or at least proper allowance for overhead expense. Contracts for professional service, taken without proper allowance for overhead expense, cannot be correctly executed without a very large financial loss. A loss so big that the temptation to cut the character of service is almost irresistible. In some cases not even a matter of choice but amounting to actual necessity.

Few people realize even in the profession that in architecture, essential overhead amounts to from 75 to 100% of actually chargeable direct cost. In addition to the enumerable incidental expenses of operating an Architect's office, fully half of an Architect's time must be devoted to essential work of the most exacting character, work which cannot be charged direct to any particular job, and yet work which would amount to a loss to all jobs if not done.

Neglected or poorly executed work on any job reflects on the integrity and competency of the entire profession. Inadequate remuneration for any service means ultimate financial distress, which in any individual of any profession, reflects on the standing of the entire profession. It is not to the advantage of the client to have a servant that is being insufficiently paid to meet his necessary appropriate living costs.

COMPETITION

Competition is accused of being the life of trade, but if it is unfair, it may be a very unhappy life for poor old trade.

Fair competition in the building industry is not at all possible unless the competitors are figuring on the same clear concise understandable specification and plans.

There can be no more ridiculously absurd business error, than to assume that the different competitors can make their own specifications and have their bids compared on the same basis. Specifications prepared by per-

sons not posted in the technique and practice of the line are certain not to be uniformly interpreted, thus making for lack of uniformity in the work and material on which estimates are made. With estimates thus prepared, it is impossible to tell who is the lowest bidder, also after contracts are let these lead to much controversy between the owner and contractor concerning what is required.

Competition is not fair competition where the bidders are not on a substantially equal basis as to disposition to serve, technical skill, corps of skilled labor available, credit, and sources of material supply. Here again, while there should be sufficient capital, the will to co-operate and technical skill and experience are paramount requirements. Capital alone cannot produce a satisfactory contractor. If the owner meets his obligations promptly when they fall due, a competent contractor can give eminently satisfactory service with a small working capital. The owner should not expect his contractor to be his banker.

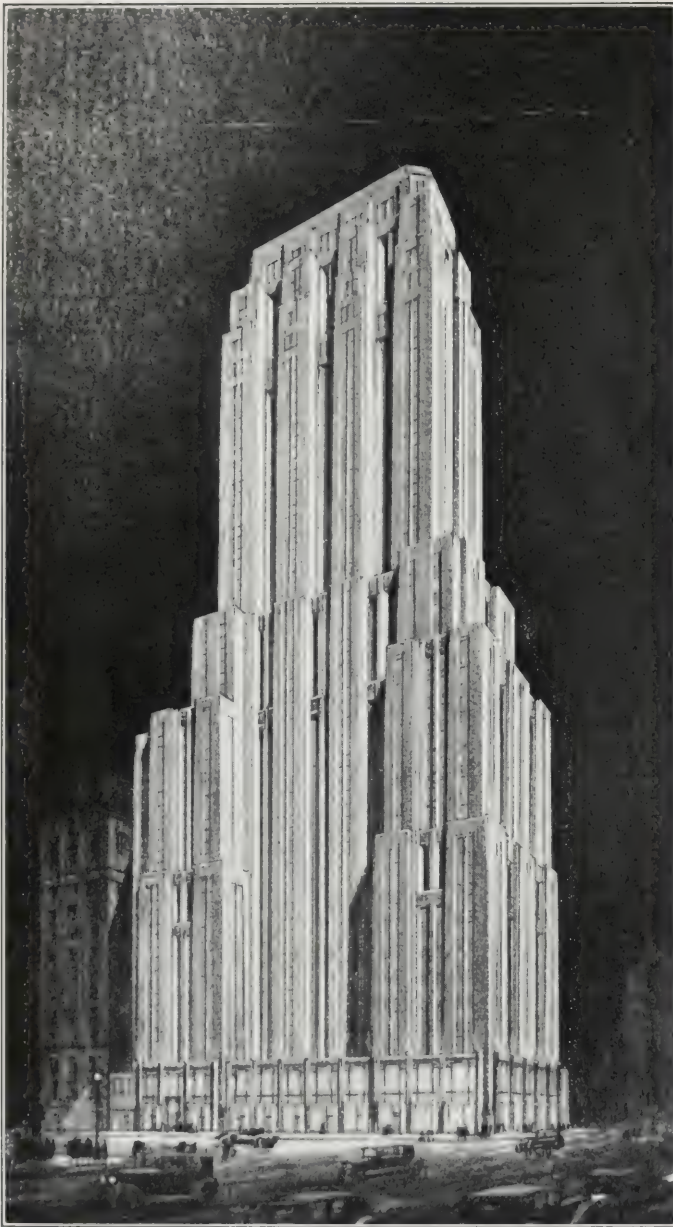
The selection of the list of those to be invited to bid on a given project requires expert experience. No one should be allowed to bid on a project which is beyond his ability to handle. The buyer's representative should know his market and be able to accurately identify a bargain price. To get the best results, his employer must trust him to the extent of backing him in the quick acceptance of a good buy before it is lost.

The best buyer's representative that a building owner can secure is a well trained and experienced Architect of unquestioned integrity. To be equipped for this work, the Architect has to maintain an information bureau concerning the limitations, integrity and ability of contractors and material men in all branches of the building trade. He is unwise if he lets any contract without careful knowledge of the record of the contractor. To keep this list, all of the time up to date, requires an enormous amount of correspondence and telephone conversation.

The owner should realize that office overhead for this purpose, clerk hire, telephone, etc., amounts to a very considerable expense. He may be very sure that an Architect who is working on a salary for some one else and doing his work evenings and Saturday afternoons has not the office organization to attend to these matters properly. This is the reason why he seems to do work for less than the legitimate Architect. The answer is that he does not do all or even the most needed part of an Architect's work. He may be a fine draftsman, but fine draftsmanship is not architecture. Fine draftsmanship like fine words is nothing unless there is a knowledge back of it.

There is still another phase of building construction competition. Bidders on building work spend large sums of money in making the quantity surveys necessary to the preparing of their estimates. This they are willing to do if the bidding is conducted fairly. They hesitate and often refuse to submit bids to unknown owners or Architects without reputations for fair dealing. It costs much time and means painstaking care to maintain a reputation for judicially fair dealing. There must be no snap judgment; each competitor must have his fair hearing.

Architects are in the building game all of the time, owners of buildings are only in this game occasionally. Does it not stand to reason that contractors will compete for Architect's permanent business rather than the owner's temporary business?



Palmolive Building
Chicago
Architects
Holabird & Root
General Contractors
Lundoff-Bicknell Co.

**Robert W. Hunt
Company**

inspected and tested
the Structural steel,
cement and reinforcing
bars for this building.

A partial list of representative structures for which our various services were also used:

Board of Trade
Chicago, Illinois
Los Angeles Hospital
Los Angeles, Calif.
Chicago Opera House
Chicago, Illinois
Smith-Young Tower
San Antonio, Texas
Daily News Building
Chicago, Illinois
Chase National Bank
New York, N. Y.
Foreman Nat'l Bank
Chicago, Illinois
Bamberger Store Bldg.
Newark, N. J.
Merchandise Mart
Chicago, Illinois
Public Service Bldg.
Portland, Oregon
Willoughby Tower
Chicago, Illinois
Medical Arts Bldg.
Dallas, Texas
McCormick Women's
Building
Chicago, Illinois
Gulf Office Building
Houston, Texas
Schroeder Hotel
Milwaukee, Wis.
Sterick Building
Memphis, Tenn.
Titche-Goettinger
Building
Dallas, Texas
Tennessee Terrace
Hotel
Knoxville, Tenn.

ROBERT W. HUNT COMPANY

Engineers

INSPECTION - TESTS - CONSULTATION

Chemical, Physical and Cement Laboratories

General Offices: 22nd Floor Insurance Exchange

CHICAGO

THE ILLINOIS SOCIETY OF ARCHITECTS

CANONS OF PROFESSIONAL ETHICS

Preamble.

The architect is engaged in a profession which carries with it grave responsibilities to the public. These duties and responsibilities cannot be met unless the motives, conduct and ability of the members of the profession are such as to command respect and confidence.

The profession of architecture calls for men of the highest integrity, and executive and artistic ability.

The architect is entrusted with financial undertakings where his honesty of purpose must be above suspicion; he acts as professional adviser to his client, and his advice must be absolutely disinterested; he is charged with the exercise of judicial functions as between client and contractor, and must act with entire impartiality, and he has moral responsibilities toward his professional associates and subordinates.

The people of the State of Illinois have a right to expect a high standard of practice and conduct on the part of the architects whom they have licensed to practice. Because an architect is a quasi public official it is imperative that he assume no obligations which shall place official duty and self-interest in conflict.

The Canons of Ethics

No set of rules can be framed which particularize all the duties of the architect in his various relations to the public, to his client, to the building trades and to his professional brethren.

The following canons of ethics cover certain broad principles which should govern the conduct of members of the profession and should serve as a guide in circumstances other than those enumerated:

I.—On Certain Duties to the Public.

The architect's more important work is of a character so permanent and enduring that he owes it to the public to use his best efforts to make it such as may raise the standard of taste in the community and be in itself a public ornament. He should design with due regard to surroundings and should endeavor to check any individualism, whether in himself or his client, that is opposed to the public good. He should take part in those movements for public betterment in which his training and experience enable him to give useful service. He should insist on safe and sanitary construction and he should at all times hold the safeguarding of human life and health as of paramount importance to the interests of client, contractor or self.

II.—On the Architect's Status.

The architect's relation to his client is primarily that of professional advisor. This relation maintains throughout the entire

period of his service. When, however, a contract is executed between his client and a builder or other person by the terms of which the architect becomes the official interpreter of its conditions and the judge of its performance, a new relation is created. In respect to the matters under contract, it is incumbent upon the architect to side neither with the client nor contractor, but to endeavor, in so far as his action may determine, that the contract be faithfully carried out according to its true spirit and intent.

It is not proper for the architect to assume to act as the owner's agent unless he has been specifically empowered so to act: by so doing he becomes a party to the contract and in a sense disqualified in his judicial capacity.

The fact that the architect's payment comes through the client does not invalidate his professional obligation to act with impartiality to both parties to the contract. It is essential, however, in order to eliminate the influence of self-interest, that the architect shall not enter into any contract with the client which shall condition his payment upon his decisions or advice.

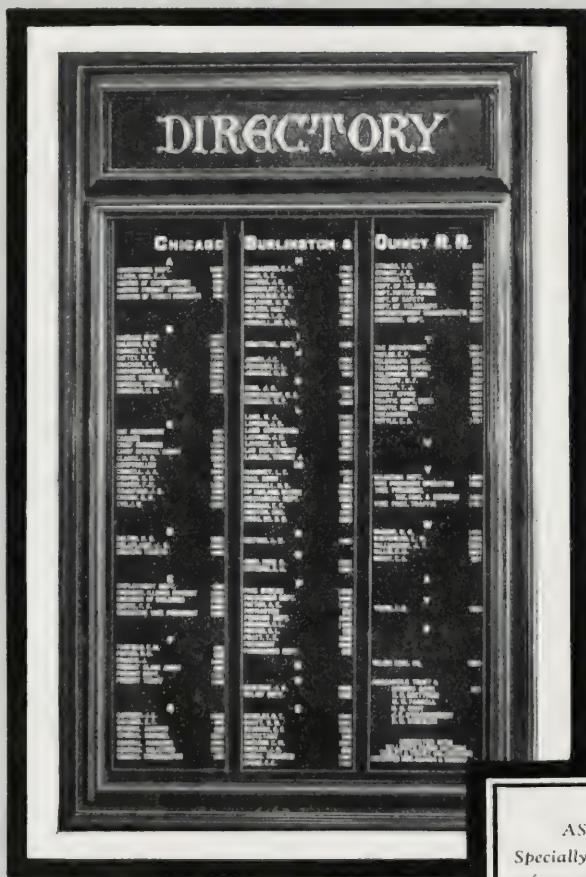
III.—On Preliminary Drawings and Estimates.

The architect should impress upon his client at the outset the importance of sufficient time for the study and preparation of drawings and specifications. If, on the basis of approved preliminary sketches, the approximate cost of the work has been mutually considered, the architect should endeavor to bring his working drawings to meet such approximate cost, provided that his client has requested no departure from the original basis of estimate. But at the same time he should acquaint his client with the conditional character of preliminary estimates. Complete and final figures can be had only from complete and final drawings and specifications. If an unconditional limit of cost is imposed before such drawings are made and estimated, the architect must be free to make such adjustments as seem necessary to that end.

IV.—On Superintendence and Expert Service.

On all work except the simplest, it is to the interest of the client to employ an inspector or clerk-of-the-works; in many engineering problems and in certain esthetic problems such as sculpture, decorative painting, gardening and the like, it is to the interest of the client to have specialized expert service. The architect should so inform the client and assist him in obtaining such service. In order to secure unified and harmonious working organization, only such persons should be selected by the owner for consulting experts as shall work in harmony with the architect and shall be approved by him.

The STANDARD For Thirty-five Years



T & T DIRECTORY EQUIPMENT
can now be had under our proven
Service Plan or by Outright Purchase.

Be sure to specify T & T
BUILDING DIREC-
TORY EQUIPMENT
the recognized standard
among architects and
builders.

STANDARD FOR
DESIGN-- because,
being the first, all others
are mere imitations.

STANDARD FOR
QUALITY-- because
of proven durability.

STANDARD FOR
SERVICE-- because
our 35 years' experience
and 8,000 satisfied
customers enable us to
maintain an organiza-
tion which renders im-
mediate, dependable
service.

ASK FOR OUR

Specially prepared personal
reference file which gives you
complete specifications and
details of T & T Building
Directories and Directional
Signs.

The TABLET & TICKET CO.

115 EAST 23rd STREET
NEW YORK

1021 WEST
ADAMS ST.



CHICAGO
ILLINOIS

407 SANSOME STREET
SAN FRANCISCO

V.—On the Architect's Charges.

The schedule of charges of the Illinois Society of Architects is recognized as a proper minimum of payment, but where no other architect is affected it is allowable for an architect to make such an arrangement with his client as is mutually satisfactory. He may not reduce his fee below the schedule of charges in an attempt to supplant another architect; it is reasonable and proper to charge higher rates than those of the schedule when his special skill and the quality of his service justify the increase.

A system of compensation based on the actual cost to the architect on a given piece of work plus an agreed professional fee, has much to commend it.

VI.—On Needless Expenditure.

The architect should scrupulously guard cost, and refrain from introducing needless expense or any extravagance in material or construction that may add to cost of building, without compensating gain to the client.

VII.—On Payments for Expert Service.

When retained as an expert, whether in connection with competitions or otherwise, the architect should receive a compensation proportionate to the responsibility and difficulty of the service. No duty of the architect is more exacting than such service, and the honor of the profession is involved in it. Under no circumstances should experts, knowingly, name prices in competition with each other for a given employment. Where governmental regulations prohibit adequate compensation for expert service, it is better to render such service without emolument than to accept a payment out of proportion to the importance of the service rendered.

VIII.—On the Selection of Bidders or Contractors.

The architect should advise his client in the selection of bidders and in the award of contract.

In selecting none but worthy bidders and in advising the award only to contractors who are honest and competent, the architect protects the interests of his client and helps to raise the ethical standard in building.

IX.—On Duties to the Contractor.

On the signing of a contract between owner and builder, the architect is placed in a judicial position and is bound to act with absolute fairness; he is also judge in his own right, deciding whether or not the intent of his plans or specifications is properly carried out, and exercising his judgment as to the true meaning thereof. He should, therefore, take special care to see that these drawings and specifications are complete and accurate, and he should never call upon the contractor to make good his own oversights or errors, or attempt to shirk responsibility by "blanket" clauses.

X.—On Engaging in the Building Trades.

The architect should not engage in any of the building trades, nor should he form

any trade partnership or agreement with any person or firm connected therewith; nor should he have any financial interests in any building material or device of such a nature as to render his professional action liable to a suspicion of self-interest; if he have any interest in building material or device, he should not specify or use the same without the full knowledge and approval of his client.

XI.—On Accepting Commission or Favors.

The architect may not receive any commission or any substantial service or favor from a dealer, a contractor, or from any interested person other than his client.

XII.—On Encouraging Good Workmanship.

In his authority to interpret and enforce the provisions of the contract, the architect is vested with large powers which he should use with unbiased judgment. While he must condemn bad work, he should also make a point of commending that which is good.

Intelligent initiative, artistic or mechanical, on the part of craftsmen and workmen, should be promptly recognized and encouraged, and the architect should make evident his appreciation of the dignity and importance of their work.

XIII.—On Offering Service Gratuitously.

The offering of professional service on approval, unless warranted by personal or previous business relations, tends to lower the dignity and standing of the profession; also to provide motive for dishonest representation and is to be condemned.

XIV.—On Advertising.

Advertising in any form is to be discouraged as tending to lower the standing of the profession. The presentation of ordinary business cards is a matter of individual taste and not per se improper; but the solicitation of work by circulars or advertisements and the inspiring or inserting of self-laudatory notice in the press are unprofessional.

The best recommendation of an architect is a well-merited reputation for professional capacity and fidelity to trust.

XV.—On Signing Buildings and Use of Titles.

The signing of buildings has the indorsement of the Chicago Architect's Business Association. The use of the initials designating degrees or technical society membership is proper in connection with any professional service and is encouraged as helping to make known the nature of the honor they imply.

XVI.—On Competitions.

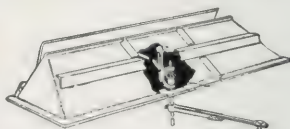
In no way does the architect come more conspicuously before the public than through competitions. It is especially desirable that in such circumstances he should conduct himself with self-respect and dignity. To undervalue and cheapen his service or to compete where a just award is not safe guarded is inconsistent with this position. Competitions are undesirable from the stand-

Colonial Damper



the **PREFERRED** fire control

For over twenty years the Colonial Head-Throat and Damper has been recognized as the unrivaled control to insure successful fireplaces. No other feature will contribute as much to the satisfactory operation of your fireplace design because the Colonial Damper compels correct formation of the fireplace throat—the vital part—and takes up heat expansion within itself—an exclusive feature.



Style "G" extension operating device enables the Colonial Damper to be set up high in the throat where only the best results of draft control can be obtained.



*The Victor Electric Fireplace—
a complete fireplace unit built
ready to set against any wall
like a piece of furniture. In-
cludes mantel, facing, grate,
amber coals and "Glo-bar"
heating element. Complete,
beautiful, practical and
economical.*

The Colonial "Victor Unit"

The Colonial Victor Electric Fireplace a complete fireplace for a room without flues. No installation worries—only an electrical outlet needed. Gives clean, odorless, healthful cheering heat and appearance of burning coals at low cost. Does not devitalize the air or burn up oxygen.

*Write for our complete catalog
and full particulars.*

Colonial Fireplace Co.

4626 Roosevelt Road Chicago, Ill.

point of both the client and the architect and a member of the Association should discourage the holding of same. If a competition becomes inevitable, because of governmental regulations, he should not enter either as a competitor or a professional advisor unless the competition is to be conducted according to the best practice and usage of the profession as formulated from time to time by the American Institute of Architects. Except as an authorized competitor he may not attempt to secure work for which competition has been instituted.

He may not present drawings to secure work for which competition has been closed but not decided.

He may not attempt to influence the award in any competition.

XVII.—On the Expert's Future Status.

An architect may not undertake a further commission on any building or work after having acted in an expert capacity in formulating a program which later is put into effect, or after having acted in an advisory capacity in the matter of awards in competition. Having acted in either or both of such capacities should bar an architect from eligibility to execute commissions upon the work in question.

XVIII.—On Criticising the Work of Others.

An architect may not criticise publicly in the press the work of a fellow architect except over his own signature, or editorially; and he may not intentionally injure, directly or indirectly, the reputation, prospects or business of a fellow architect.

XIX.—On Undertaking the Work of Another.

An architect may not undertake a commission while the just claim of a fellow architect, who had previously undertaken it, remains unsatisfied; nor may he attempt to supplant a fellow architect or to obtain a commission after steps have been taken toward the appointment of another architect.

XX.—On Duties Toward the Student Draughtsman.

It is the duty of the architect to advise and assist those who intend making architecture their career. The intending student should be urged to secure a preparation of broad general culture equivalent to that required for the degree of A. B., concurrently with or followed by a thorough course in a well organized school of architecture.

In cases where such preparation is out of the question and the beginner must get his training in the office of an architect, the latter should assist him to the best of his ability by instruction and advice. An architect, should as far as possible, urge his draughtsmen to avail themselves of educational opportunities. To this end he should give encouragement to all worthy schemes and institutions for architectural education.

Members of the society cannot too strongly insist that a thorough technical preparation for the practice of architecture should rest upon a foundation of general culture.

XXI.—On Duties Toward Building Authorities.

The architect should support all federal, state and municipal officials who have charge of matters relating to building and endeavor to maintain or improve the standards of their departments. His quasi public official capacity requires him to show respect for law by careful and conscientious compliance with all building regulations, and if any such appear to him unwise or unfair, he should endeavor to have such regulations altered, but until so altered he should comply with them. An architect because of his official relation to the state and of his moral obligation should not even under his client's instructions encourage any practices contrary to law or hostile to public interests; for he is not obliged to accept a given piece of work, hence he cannot urge in extenuation and to escape the condemnation attaching to his acts that he has but followed his client's instructions.

XXII.—On Professional Qualifications.

The assumption of the title of architect should be held to mean that the bearer has the professional knowledge, both theoretical and practical, and the natural ability needed for the proper invention, illustration and supervision of all building operations which he may undertake.

XXIII.—On Matters Adjudged Unprofessional.

The following code, based on a report of a special committee of the American Institute of Architects, is adopted by the Illinois Society of Architects as a general guide, yet the enumeration of particular duties should not be construed as the denial of the existence of others equally imperative though not specifically mentioned. It should also be noted that these sections indicate offenses of greatly varying degrees of gravity:

It is unprofessional for an architect—

1. To engage in any of the building trades or to form any trade partnership or agreement with any person or firm engaged therein.
2. To guarantee an estimate or contract by bond or otherwise.
3. To accept a commission or any substantial service or favor from a contractor, or anyone connected with the building trades.
4. To advertise in any form.
5. To enter any competition the terms of which are not in harmony with principles approved by the American Institute, especially if such terms have been specifically condemned by the American Institute or a local chapter thereof.
6. To attempt in any way except as a duly authorized competitor to secure work for which a competition has been instituted.
7. To attempt to influence the award of a competition.
8. To injure intentionally the fair reputation, prospects or business of another architect.
9. To criticise anonymously in the public prints, except editorially, the professional conduct or work of a fellow architect.
10. To undertake a commission while the just claim of another architect who has previously undertaken it remains unsatisfied.
11. To attempt to supplant a fellow architect after definite steps have been taken toward his employment.
12. To offer or perform services at rates lower than those approved as minimum by the Illinois Society of Architects in an attempt to supplant or underbid another architect.
13. To act in a manner detrimental to the best interests of the profession.

PERMANENCE



MIDLAND

TERRA COTTA

Always a Sign of
Quality Terra Cotta

Midland Terra Cotta Company

105 West Monroe Street,
Chicago, Illinois

SCHEDULE OF PROPER MINIMUM CHARGES AND PROFESSIONAL PRACTICE OF ARCHITECTS RECOMMENDED BY THE ILLINOIS SOCIETY OF ARCHITECTS

1. The architect's professional services consist of the necessary conferences, the preparation of preliminary studies, working drawings, specifications, large scale and full size detail drawings, and of the general direction and supervision of the work, for which, except as hereinafter mentioned, the minimum charge is six per cent (6%), based upon the total cost of the work complete.

In case of the discontinuance or abandonment of the work, the architect's charge shall be based upon an *estimated* total cost, which estimated total cost may be determined by the architect, by experts, or by the lowest bids of responsible contractors. *Total cost* is to be interpreted as the cost of all materials and labor necessary to complete the work, plus contractors' profits and expenses, as such cost would be if all materials were new and all labor fully paid, at market prices current when the work was ordered.

2. On residential work, on alterations to existing buildings, on monuments, furniture, decorative and cabinet work, and landscape architecture, it is proper to make a higher charge than above indicated.

3. The architect is entitled to compensation for articles purchased under his direction, even though not designed by him.

4. If an operation is conducted under separate contracts, rather than under a general contract, it is proper to charge a special fee in addition to the charges mentioned elsewhere in this schedule.

5. Where the architect is not otherwise retained, consultation fees for professional advice are to be paid in proportion to the importance of the questions involved and services rendered.

6. Where heating, ventilating, mechanical, structural, electrical and sanitary problems are of such a nature as to require the services of a specialist, the owner is to pay for such services in addition to the architect's regular commission. Chemical and mechanical tests and surveys, when required, are to be paid for by the owner.

7. Necessary traveling expenses are to be paid by the owner.

8. If, after a definite scheme has been approved, changes in drawings, specifications or other documents are required by the owner; or if the architect be put to extra labor or expense by the delinquency or insolvency of a contractor, the architect shall be paid for such additional services and expense.

9. The architect's entire fee is itemized and proportionate payments on account are due the architect, as the following items are completed:

Preliminary Studies	2
General drawings	3
Specifications	1
Scale and full size details.....	1
General Supervision of the work.....	3

Total1.00

Fee for complete services as agreed, or see paragraphs 1 and 12.

10. Items of service are comprehended as follows:

(a) **Preliminary Studies** consist of the necessary conferences, inspections, studies and sketches modified and remodified to determine the client's problem and illustrate a satisfactory general solution of same, both as to plan and elevation. Illustrative sketches for this purpose need not be to accurate scale, but should be approximately correct as to general dimensions and proportion.

(b) **General Drawings** include figured scale plans of the various stories, elevations of all the fronts, such general vertical sections as may be necessary to elucidate the design, and such details, drawn to still larger scale as, with the assistance of printed notes, and of the accompanying specifications, may make the whole scheme clearly evident to the mind of the competent builder and give him a full and complete comprehension of all the structure conditions as they affect the vital questions of quality and quantity of materials, of character of workmanship, and of cost.

(c) **Specifications** consist of a supplementary statement in words, of at least all those items of information regarding a proposed building which are not set forth in the drawings.

(d) **Detail Drawings** include all the necessary supplementary drawings required for the use of the builders, to enable them to so provide and shape their material that it may be adjusted to its proper place or function in the building with the least delay, and the smallest chance for errors and misfits. If not prepared until after the contract for the building is let they must not impose on the contractor any labor or material which is not called for by the spirit and intent of the "General Drawings" and "Specifications."

(e) The **Supervision** of an architect (as distinguished from the continuous personal superintendence which may be secured by the employment of a clerk-of-the-works or inspector of construction) means such inspection by the architect or his deputy, of work in studios and shops or a building or other work in process of erection, completion or alteration, as he finds necessary to ascertain whether it is being executed in general conformity with his drawings and specifications or directions. He has authority to reject any part of the work which does not so conform and to order its removal and reconstruction. He has authority to act in emergencies that may arise in the course of construction, to order necessary changes, and to define the intent and meaning of the drawings and specifications. On operations where a clerk-of-the-works or inspector of construction is required, the architect shall employ such assistance at the owner's expense.

11. Drawings and specifications, as instruments of service, are the property of the architect.

12. Exceptions.
Dwellings costing less than \$10,000.....10%
Lofts not requiring special planning for machinery or arrangement..... 5%
Additions and alterations to dwellings.....12%
Additions and alterations to business buildings10%

N. B.—Above schedule is considered minimum for ordinary and usual professional service. It is not considered fair or reasonable for highly specialized service.



Pylons, Congress Street Plaza, Grant Park, Chicago
South Park Commissioners Bennett, Parsons & Frost, Consulting Architects

BENEDICT STONE

Largest Manufacturers of Building Stone

Works:

NEW YORK
MONTREAL

CHICAGO
SYDNEY

BALTIMORE
BRISBANE

EXTRACTS FROM THE NEW CIVIL ADMINISTRATIVE CODE OF THE STATE OF ILLINOIS

Which Affects the practice of the Architectural Profession in this State

An Act in relation to the civil administration of the State government, and to repeal certain Acts therein named. [Approved March 7, 1917, in force July 1, 1917.]

GENERAL PROVISIONS.

Section 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly: This Act shall be known as "The Civil Administrative Code of Illinois."

Sec. 2. The word "department," as used in this Act shall, unless the context otherwise clearly indicates, mean the several departments of the State government as designated in Section 3 of this Act, and none other.

Sec. 3. Departments of the State government are created as follows:

- The department of finance;
- The department of agriculture;
- The department of labor;
- The department of mines and minerals;
- The department of public works and buildings;
- The department of public welfare.
- The department of public health;
- The department of trade and commerce;
- The department of registration and education.

Sec. 4. Each department shall have an officer at its head who shall be known as a director, and who shall, subject to the provisions of this Act, execute the powers and discharge the duties vested by law in his respective department.

Sec. 5. In addition to the directors of departments, the following executive and administrative officers, boards and commissions, which said officers, boards and commissions in the respective departments, shall hold offices hereby created and designated as follows:

In the Department of Public Works and Buildings.

Assistant director of public works and buildings;

- Superintendent of highways;
- Supervising architect;
- Supervising engineer;
- Superintendent of waterways;
- Superintendent of printing;
- Superintendent of purchases and supplies;
- Superintendent of parks.

In the Department of Registration and Education.

Assistant director of registration and education.

Superintendent of registration;

The normal school board, which shall consist of nine officers, together with the director of the department and the Superintendent of Public Instruction. The above named officers, and each of them, shall, except as otherwise provided in this Act, be under the direction, supervision and control of the director of their respective departments, and shall perform such duties as such director shall prescribe. [Amended by Act approved June 24, 1921.]

Sec. 6. Advisory and non-executive boards, in the respective departments, are created as follows:

In the Department of Registration and Education.

Neither the Director, Assistant Director, Superintendent of Registration, nor any other executive and administrative officer in the Department of Registration and Education shall be affiliated with any college or school of medicine, pharmacy, dentistry, nursing, optometry, embalming, barbering, veterinary medicine and surgery, architecture, or structural engineering, either as teacher, officer or stockholder, nor shall he hold a license or certificate to exercise or practice any of the professions, trades or occupations regulated.

The Department of Registration and Education:

The director of registration and education shall receive five thousand dollars;

The assistant director of registration and education shall receive three thousand six hundred dollars;

The superintendent of registration shall receive four thousand two hundred dollars.

10. No member of an advisory and non-executive board shall receive any compensation.

11. Each executive and administrative officer, except the two food standard officers, the members of the mining board, and the members of the normal school board shall devote his entire time to the duties of his office and shall hold no other office or position of profit.

12. Each officer whose office is created by this Act shall be appointed by the Governor, by and with the advice and consent of the Senate. In any case of vacancy in such offices during the recess of the Senate, the Governor shall make a temporary appointment until the next meeting of the Senate, when he shall nominate some person to fill such office; and any person so nominated, who is confirmed by the Senate, shall hold his office during the remainder of the term until his successor shall be appointed and qualified. If the Senate is not in session at the time this Act takes effect, the Governor shall make a temporary appointment as in case of a vacancy.

14. Each officer whose office is created by this Act shall, before entering upon the duties of his office, take and subscribe the constitutional oath of office, which shall be filed in the office of the Secretary of State.

15. Each executive and administrative officer whose office is created by this Act shall, before entering upon the discharge of the duties of his office, give bond, with security to be approved by the Governor, in such penal sum as shall be fixed by the Governor, not less in any case than ten thousand dollars, conditioned for the faithful performance of his duties, which bond shall be filed in the office of the Secretary of State.

16. The director of each department is empowered to prescribe regulations, not inconsistent with law, for the government of his department, the conduct of its employees and clerks, the distribution and performance of its business and the custody, use and preservation of the records, papers, books, documents, and property pertaining thereto.

17. Each department shall maintain a central office in the capitol building at Spring-



pecifying ART MARBLE and NON-SLIP ART MARBLE products as manufactured by—
CHICAGO ART MARBLE COMPANY
assures you of the best material.

The name ART MARBLE originated by CHICAGO ART MARBLE COMPANY, over 38 years ago represents a precast product in which marble, cement and color pigments (each the best obtainable) are scientifically blended and accurately moulded by our own inimitable processes.

The result is a superior product of beauty and durability well adapted to all interior purposes, such as:

Floors, Base and Wainscot
Complete Stairways,
Toilet and Shower Stalls,
Non-Slip Floors, Treads and Steps

Sole licensees for the use of Norton Alundum Aggregate, in all precast products, the metropolitan district of New York excluded and with reservations in New England, so called.

For Quality Specify



Manufactured by

CHICAGO ART MARBLE COMPANY
2883 to 2887 Hillock Avenue
CHICAGO, ILLINOIS

field, in rooms provided by the Secretary of State. The director of each department may, in his discretion and with the approval of the Governor, establish and maintain, at places other than the seat of government, branch offices for the conduct of any one or more functions of his department.

18. Each department shall be open for the transaction of public business at least from eight-thirty o'clock in the morning until five o'clock in the evening of each day except Sundays and days declared by the negotiable instrument Act to be holidays.

19. Each department shall adopt and keep an official seal.

20. Each department is empowered to employ, subject to civil service laws in force at the time the employment is made, necessary employees, and, if the rate of compensation is not otherwise fixed by law, to fix their compensation.

Sec. 25. Each director of a department shall annually on or before the first day of December, and at such other times as the Governor may require, report in writing to the Governor concerning the condition, management and financial transactions of his respective department. In addition to such reports, each director of a department shall make the semi-annual and biennial reports provided by the Constitution. The departments shall make annual and biennial reports at the time prescribed in this section, and at no other time.

26. The directors of departments shall devise a practical and working basis for co-operation and coordination of work, eliminating duplication and overlapping of functions. They shall, so far as practicable, co-operate with each other in the employment of services and the use of quarters and equipment. The director of any department may empower or require an employee of another department, subject to the consent of the superior officer of the employee, to perform any duty which he might require of his own subordinates.

27. The gross amount of money received by every department, from whatever source, belonging to or for the use of the State, shall be paid into the State treasury, without delay, not later in any event than ten days after the receipt of the same, without any deduction on account of salaries, fees, costs, charges, expenses or claim of any description whatever. No money belonging to, or for the use of, the State shall be expended or applied by any department except in consequence of an appropriation made by law and upon the warrant of the Auditor of Public Accounts.

35. The following offices, boards, commissions, arms, and agencies of the State government heretofore created by law, are hereby abolished, viz.:

State board of examiners of architects, State board of examiners of structural engineers, secretary of the State board of examiners of structural engineers, secretary-treasurer of the State board of examiners of architects, State inspector of masonry, public buildings and works, assistant State inspectors of masonry, public buildings and works, the board of administration.

The Department of Public Works and Buildings.

49. The department of public works and buildings shall have power:

1. To exercise the rights, powers and duties vested by law in the State highway department, the State highway commission, the chief State highway engineer, the assistant State highway engineer, and other officers and employees of the State highway service;

2. To exercise the rights, powers and duties vested by law in "The Canal Commissioners," their officers and employees;

3. To exercise the rights, powers and duties vested by law in the rivers and lakes commission of Illinois, its officers and employees;

4. To exercise the rights, powers and

duties vested by law in the Illinois waterway commission, its secretary, chief engineers, its other officers and employees;

5. To exercise the rights, powers and duties vested by law in the Illinois park commission, its officers and employees;

6. To exercise the rights, powers and duties vested by law in the Fort Massac trustees, their officers and employees;

7. To exercise the rights, powers and duties vested by law in the Lincoln homestead trustees, their officers and employees;

8. To exercise the rights, powers and duties vested by law in the board of commissioners of and for the Lincoln monument grounds, its officers and employees;

9. To exercise the rights, powers and duties vested by law in the superintendent of printing, his officers and employees;

10. To make contracts for and superintend the telegraph and telephone service for the several departments;

11. To purchase and supply all fuel, light, water and other like office and building services for the several departments except where the same are now supplied by the Secretary of State.

12. To procure and supply all furniture, general office equipment and general office supplies (other than stationery and office supplies distributed through the office of the Secretary of State) needed by the several departments;

13. To procure and supply all clothing, instruments and apparatus, subsistence and provisions for the charitable, penal and reformatory institutions;

14. To procure and supply all cots, beds, bedding, general room and cell equipment, table, kitchen and laundry equipment, agricultural implements, harness, stable and garage supplies, household supplies, periodicals, machinery and tools, medicines and medical supplies, plumbing, light and engine supplies, wagons and other vehicles and workshop supplies needed by the several departments;

14a. To purchase and supply all necessary tools, machinery, supplies and materials to be used by the State in or about constructing or maintaining State highways;

15. To prepare, or cause to be prepared, general plans, preliminary sketches and estimates for the public buildings to be erected for any department;

16. To have general supervision over the erection and construction of public buildings erected for any department, and over the inspection of all materials previous to their incorporation into such buildings or work;

17. To make contracts for, and supervise the construction and repair of buildings under the control of any department;

18. To prepare and suggest comprehensive plans for the development of grounds and buildings under the control of any department;

19. To make and provide all drawings, plans, specifications and models for the construction and perfection of all systems of sewerage, drainage and plumbing for the State in connection with the buildings and grounds under the control of any department;

20. To erect, supervise and maintain all public monuments and memorials erected by the State except where the supervision and maintenance thereof is otherwise provided by law;

21. To lease, for a term not exceeding two years, storage accommodations for the several departments;

22. To lease, for a term not exceeding two years, unproductive and unused lands or other property under the control of any department, unless longer leases thereof are expressly authorized by some law enforced by the department;

23. To lease, for a term not exceeding two years, office space in buildings for the use of the several departments;

24. To have general supervision and care



LOOK FOR THIS SIGN ON
NEW CONSTRUCTION

You Will Find Distinctive
TERRA COTTA

THE MASON WILL TELL YOU
WHY HE LIKES TO USE IT



MADE BY
The American Terra Cotta and Ceramic Co.
BUILDERS BUILDING
CHICAGO

of storerooms and offices leased for the use of the departments.

50. The advisory and non-executive boards in the department of public works shall discharge the following advisory powers and functions:

The board of art advisors shall advise to the artistic character of State buildings, works and monuments, now or hereafter constructed, and to any work of a permanent character intended for decoration or commemoration;

The board of water resource advisors shall advise relative to riparian rights of the State, and the conservation, use and development of water resources;

The board of highway advisors shall advise relative to the construction, improvement and maintenance of State highways;

The board of park and buildings advisors shall advise relative to the construction, improvement and maintenance of State parks, buildings and monuments.

51. The director of public works is authorized, with the consent in writing of the Governor, to acquire, by private purchase or by condemnation under the eminent domain Act, the necessary lands for the public buildings and grounds for the departments.

52. All moneys received by the director of public works from rents, leases, sale of property or from any other source in connection with the management of the Illinois and Michigan Canal shall be covered into the State treasury, and shall be placed by the State Treasurer to the credit of a special fund to be known as the "Illinois and Michigan Canal fund."

The Department of Registration and Education.

53. The department of registration and education shall have power:

1. To exercise the rights, powers and duties vested by law in the board of education of the State of Illinois, the board of trustees of the Southern Normal University at Carbondale, the board of trustees of the Northern Illinois State Normal School at DeKalb, the board of trustees of the Eastern Illinois State Normal School at Charleston, and the board of trustees of the Western Illinois State Normal School at Macomb;

2. To exercise the rights, powers and duties vested by law in the board of veterinary examiners and the State board of live stock commissioners relating to the practice of veterinary medicine and surgery in the State of Illinois;

3. To exercise the rights, powers and duties vested by law in the board of examiners of horseshoers;

4. To exercise the rights, powers and duties vested by law in the State board of examiners of architects;

5. To exercise the rights, powers and duties vested by law in the State board of examiners of structural engineers.

60. The department of registration and education shall, wherever the several laws regulating professions, trades and occupations which are devolved upon the department for administration so require, exercise, in its name, but subject to the provisions of this Act, the following powers:

1. Conduct examinations to ascertain the qualifications and fitness of applicants to exercise the profession, trade or occupation for which an examination is held; and pass upon the qualifications of applicants for reciprocal licenses, certificates and authorities;

2. Prescribe rules and regulations for a fair and wholly impartial method of examination of candidates to exercise the respective professions, trades or occupations;

3. Prescribe rules and regulations defining, for the respective professions, trades and occupations, what shall constitute a school, college or university, or department of a university, or other institutions, reputable and in good standing and to determine the reputability and good standing of a

school, college or university, or department of a university, or other institution, reputable and in good standing by reference to a compliance with such rules and regulations;

4. Adopt rules providing for and establishing a uniform and reasonable standard of maintenance, instruction and training to be observed by all schools for nurses which are to be deemed reputable and in good standing and to determine the reputability and good standing of such schools for nurses by reference to compliance with such rules and regulations;

5. Establish a standard of preliminary education deemed requisite to admission to a school, college, or university, and to require satisfactory proof of the enforcement of such standard by schools, colleges and universities;

6. Conduct hearings on proceedings to revoke or refuse renewal of licenses, certificates or authorities of persons exercising the respective professions, trades or occupations, and to revoke or refuse to renew such licenses, certificates or authorities;

7. Formulate rules and regulations when required in any act to be administered.

None of the above enumerated functions and duties shall be exercised by the department of registration and education, except upon the action and report in writing of persons designated from time to time by the director of registration and education to take such action and to make such report, for the respective professions, trades and occupations as follows:

For the architects, five persons, one of whom shall be a member of the faculty of the University of Illinois, and the other four of whom shall be architects residing in this State, who have been engaged in the practice of architecture at least ten years;

For the structural engineers, five persons, one of whom shall be a professor in the civil engineering department of the University of Illinois, and the others of whom shall be structural engineers of recognized standing, who have had not less than ten years' practical experience, then practicing as structural engineers in this State.

The action or report in writing of a majority of the persons designated for any given trade, occupation or profession, shall be sufficient authority upon which the director of registration and education may act.

In making the designations of persons to act for the several professions, trades and occupations, the director shall give due consideration to recommendations by members of the respective professions, trades and occupations and by organizations therein.

Whenever the director is satisfied that substantial justice has not been done either in an examination or in the revocation of or refusal to renew a license, certificate or authority, he may order reexaminations or re-hearings by the same or other examiners.

61. All certificates, licenses and authorities shall be issued by the department of registration and education, in the name of such department, with the seal thereof attached.

Repeal.

64. The following Acts and parts of Acts are hereby repealed:

"An Act creating the office of supervising architect of the State of Illinois and defining his powers and duties," approved April 24, 1899, in force July 1, 1899;

"An Act creating the office of supervising engineer for the General Assembly, its members and committees, and the Board of Administration of the State of Illinois, and fixing his compensation," approved June 10, 1911, in force July 1, 1911;

"An Act to create a State art commission, and to define its powers and duties," approved June 4, 1909, in force July 1, 1909;

An Act creating the office of State inspector of masonry, public buildings and works, and prescribing qualifications, duties and compensation," approved June 28, 1915, in force July 1, 1915.

5 Reasons

Why You Should Specify Richardson's Laid Floors

1. We handle only dependable floor coverings.
2. You are always assured of expert laying.
3. Our service is superior in every respect.
4. You can purchase at low contract prices.
5. You benefit by our experience of 54 years.

Very seldom is an institution as efficiently equipped to serve you quickly and intelligently as Richardson's. Here you will find men who are experts in their chosen line of endeavor . . . ready to fulfill your wishes to your entire satisfaction.

Carpets

In this branch, we stand unexcelled in the unusually wide selection that we carry. Carpets constructed for every conceivable purpose . . . in every conceivable pattern and color . . . are awaiting your inspection. Nationally advertised qualities at prices that will prove an aid in your specifications.

Linoleum

Richardson's prices to you are the result of mass production of the nationally advertised Armstrong Cork Company, and the complete showing of over 464 colorful patterns will appeal to you not only from an economical standpoint but from an ornamental view-point as well. A telephone call will bring an expert to your door with the samples without obligation.

Rubber Tile

Individually designed in both color and pattern to suit the most fastidious specifications. These custom-made floors are stain and water proof, noiseless and sanitary, easily cleaned. The durability and service of this unique floor covering will be a revelation to you when compared with the price.

Lino-Tile

A heavy gauge floor covering—hand laid—in many different sizes of tile—when expertly handled creates designs to match any color scheme.

Cork Tile

Most satisfactory for churches, libraries, and other buildings, where quiet is a paramount issue. Cork resiliency aids much to comfort.

Telephone State 8860, Contract Dept., for representative to call.

O.W. Richardson & Co.

Lake near Marion
Oak Park

125 So. Wabash Avenue
Just North of Adams

THE ILLINOIS ARCHITECTURAL ACT

An Act to provide for the licensing of architects and to regulate the practice of architecture as a profession and to repeal certain Acts therein named.

Section 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly: It shall be unlawful for any person to practice architecture or advertise or put out any sign or card or other device which might indicate to the public that he or she is entitled to practice as an architect, without a certificate of registration as a registered architect, duly issued by the Department of Registration and Education under this Act, and as provided for in the Civil Administrative Code of Illinois.

Sec. 2. Any one, or any combination of the following practices by a person shall constitute the practice of architecture, namely: The planning or supervision of the erection, enlargement or alteration of any building or buildings or of any parts thereof, to be constructed for others. A building is any structure consisting of foundations, floors, walls, columns, girders, beams and roof, or a combination of any number of these parts, with or without other parts.

Sec. 3. No corporation shall be licensed to practice architecture in this State or be granted a certificate of registration under this Act, but it shall be lawful for a stock company or a corporation to prepare drawings, plans and specifications for buildings and structures as defined in this Act which are constructed, erected, built, or their construction supervised by such stock company or corporation, provided that the chief executive officer or managing agent of such stock company or corporation in the State of Illinois shall be a registered architect under this Act, and provided further that the supervision of such buildings and structures shall be under the personal supervision of said registered architect and that such drawings, plans and specifications shall be prepared under the personal direction and supervision of such registered architect and bear the stamp of his official seal.

It shall be lawful, however, for one or more registered architects to enter a partnership with one or more licensed structural engineers, licensed under the laws of this State, for the practice of their professions.

Sec. 4. Nothing contained in this Act shall prevent the draftsmen, students, clerks of works, superintendents and other employees of those lawfully practicing as registered architects under the provisions of this Act, from acting under the instruction, control or supervision of their employers, or to prevent the employment of superintendents of the construction, enlargement or alteration of buildings or any parts thereof, or prevent such superintendents from acting under the immediate personal supervision of the registered architect by whom the plans and specifications of any such building, enlargement

or alteration were prepared. Nor shall anything contained in this Act prevent persons, mechanics or builders from making plans, specifications for or supervising the erection, enlargement or alteration of buildings or any parts thereof to be constructed by themselves or their own employees for their own use, provided that the working drawings for such construction are signed by the authors thereof with a true statement thereon of their relation to such construction and that the makers thereof are not architects:

Provided, nothing in this Act contained shall be held or construed to have any application to any building, remodeling or repairing of any building or other structure outside of the corporate limits of any city or village, where such building or structure is to be, or is used for residential or farm purposes, or for the purposes of outbuildings or auxiliary buildings in connection with such residential or farm premises; nor shall said Act apply to any building, remodeling or repairing of any building or structure within the corporate limits of any city or village, where the total cost of said building, remodeling or repairing does not exceed the sum of seventy-five hundred dollars.

Sec. 5. Any person who is twenty-one years of age and of good moral character is qualified for an examination for a certificate of registration as a registered architect, provided he or she has graduated from a high school or secondary school, approved by the Department of Registration and Education, or has completed an equivalent course of study as determined by an examination conducted by the Department of Registration and Education, and has subsequently thereto completed such courses in mathematics, history, and language, as may be prescribed by said Department, and has had at least three years' experience in the office or offices of a reputable architect or architects.

Sec. 6. Upon payment of the required fee, an applicant who is an architect, registered or licensed under the laws of another State or territory of the United States, or of a foreign country or province, may, without examination, be granted a certificate of registration as a registered architect by the Department of Registration and Education in its discretion upon the following conditions:

(a) That the applicant is at least twenty-one years of age, of good moral character and temperate habits; and

(b) That the requirements for the registration or licensing of architects in the particular State, territory, country or province were, at the date of the license, substantially equal to the requirements then in force in this State.

Sec. 7. Every person who desires to obtain a certificate of registration shall apply therefor to the Department of Registration and Education in writing, upon blanks prepared



Bankers Building, Chicago. Architects, D. H. Burnham & Co., Inc.; Contractors, Dilks Construction Co., both of Chicago. For the beautiful and artistic Benedict Art Stone shown in the detail and for other concrete work in this towering structure, Universal portland cement was used.

and furnished by the Department of Registration and Education. Each application shall be verified by the applicant under oath and shall be accompanied by the required fee.

Sec. 8. The Department of Registration and Education shall hold examinations of applicants for certificates of registration as registered architects at such times and places as it may determine. The examination of applicants for certificates of registration as registered architects, where these applicants have had less than ten years proved architectural practice as a principal in the practice of architecture as a profession, shall consist of written and drafting tests supplemented by verbal examination at the discretion of the Examining Committee and shall embrace the following subjects:

- (a) The planning, designing and construction of buildings.
- (b) The strength of building materials.
- (c) The principles of sanitation and ventilation as applied to buildings.
- (d) The ability of the applicant to make practical application of his knowledge in the ordinary professional work of an architect and in the duties of a supervisor of mechanical work on buildings.

(e) The examinations of applicants for certificates of registration as registered architects, where the applicant shall have had ten or more years proved architectural practice as a principal in the practice of architecture as a profession, shall be by exhibits of preliminary studies, general drawings, specifications and detail drawings, prepared under the personal supervision of the applicant; by photographs of executed work and evidence of authorship, supplemented by a verbal quiz as to reasons for methods used and procedure shown and by proof of honorable practice, or by any or all of these, which in the judgment of the Examining Committee are necessary to determine the applicant's qualifications as an architect, which shall be equivalent to or superior in relative value to the requirements set forth in the preceding paragraphs of this section for an applicant having had less than ten years' experience.

The Department of Registration and Education may by rule prescribe additional subjects for examination.

Sec. 9. Whenever the provisions of this Act have been complied with by an applicant the Department of Registration and Education shall issue a certificate of registration to the applicant as a registered architect, which certificate shall have the effect of a license to the person to whom it is issued to practice architecture in this State, subject to the provisions of this Act.

Any license or certificate of registration heretofore issued under the laws of this State authorizing its holder to practice architecture shall, during the unexpired period for which it was issued, serve the same purpose as the certificate of registration provided for by this Act.

Sec. 10. Any person licensed to practice architecture in this State or registered as an architect under this Act shall be exempt from the provisions of any and all Acts in force in this State regulating the practice of structural engineering.

Sec. 11. Every holder of a certificate of registration as a registered architect shall display it in a conspicuous place in his principal office, place of business or place of employment.

Every registered architect shall have a seal, the impression of which shall contain the name of the architect and the words, "Registered Architect," "State of Illinois." He shall stamp with this seal all working drawings and specifications prepared by him or under his supervision. Any seal heretofore authorized under the laws of this State shall serve the same purpose as the seal provided for by this Act.

Sec. 12. Every registered architect who continues in active practice shall, annually, on or before the first day of July, renew his certificate of registration and pay the required renewal fee. Every license or certificate of registration which has not been renewed during the month of July in any year shall expire on the first day of August in that year. A registered architect whose certificate of registration has expired may have his certificate restored only upon payment of the required restoration fee.

Any architect registered or licensed in this State who has retired from the practice of architecture for a period of not more than five (5) years may have his certificate of registration renewed, at any time within a period of five (5) years after so retiring, upon making application to the Department for such renewal and upon payment of all lapsed annual renewal fees.

Sec. 13. The Department of Registration and Education may refuse to renew, or may suspend, or may revoke, any certificate of registration for any one or any combination of the following causes:

- (a) Gross incompetency.
- (b) Recklessness in the construction of buildings or their appurtenances.
- (c) Dishonest practice.
- (d) When the architect has been twice convicted for a violation of any of the provisions of this Act.
- (e) A person who has by false or fraudulent representation obtained or sought to obtain a certificate of registration as an architect.

The Department of Registration and Education shall not refuse to renew, nor suspend, nor shall it revoke any certificate of registration for any of the above causes until the person accused shall have been given at least twenty (20) days' notice in writing of the charge against him and a public hearing upon such charge has been had by the Department of Registration and Education.

Upon the hearing of any such proceeding, the Director of Registration and Education, the Assistant Director of Registration and

Now in Chicago—The World's Finest Gypsum Plant



The great new Chicago plant of the United States Gypsum Company now is in full operation, supplying the state of Illinois with Red Top Plasters, gypsum boards, and gypsum tile of highest quality. Exceptionally high grade raw gypsum is supplied this mill by boat from the company's great quarries at Alabaster, Mich.

Of interest to architects also is the company's unification of its plaster brands under the single name RED TOP, identified by a red-topped package. By specifying "Red Top," architects now are assured a standardized material for any market in the United States. The Red Top line includes

RED TOP Cement Plaster
RED TOP Wood Fiber Plaster
RED TOP Sanded Plaster
RED TOP Gauging Plasters
RED TOP Moulding Plasters

RED TOP Trowel Finishes
RED TOP Sand Float Finishes
RED TOP Finish Lime
RED TOP Mason's Hydrate
RED TOP Metal Lath Products

Other products made by the new Chicago plant:

STANDARD X Plastering System
Oriental Colored Stucco
Oriental Colored Finish Plaster
Ivory Keene's Cement
Bondcrete for Concrete
Textone Plastic Paint
Setfast Cement (for tile setting)
Thermofill Dry Fill Insulation
Sabinite Acoustical Plaster

Rocklath
Sheetrock Fireproof Wallboard
Sheetrock Tile Board
Sheetrock Metal "A" Joint System
Gyplap Sheathing
Pyrobar Partition Tile
Pyrobar Roof Tile
Pyrobar Floor Voids
U. S. G. Acoustical Tile

United States Gypsum Company

300 West Adams Street, Chicago

Education, or the Superintendent of Registration may administer oaths, and the Department of Registration and Education may issue subpoenas and procure and compel the attendance of and the giving of testimony by witnesses and may compel the production of any books and papers deemed relevant to the inquiry by the Department or by the persons designated by the Department under the Civil Administrative Code of Illinois to conduct such inquiry. The accused may have the subpoena of the Department of Registration and Education for his witnesses, and may be heard in person and by counsel, in open public hearing.

Any Circuit Court, or any judge of a Circuit Court, either in term time or in vacation, upon the application either of the Department of Registration and Education or of the accused may, by order duly entered, require the attendance and enforce the giving of testimony of such witnesses and require the production of such books and papers as are above in this section referred to before the Department of Registration and Education or the persons designated by said Department under said Civil Administrative Code to conduct the inquiry, in any hearing relating to the refusal, suspension, renewal or revocation of any certificate of registration. Upon refusal or neglect to obey the order of the said court or judge, the said court or judge may compel, by attachment or proceedings for contempt of court, or otherwise, obedience to the order.

Sec. 14. The fee to be paid by an applicant for an examination to determine his fitness to receive a certificate of registration as a registered architect shall be ten dollars (\$10).

The fee to be paid by an applicant for a certificate of registration as a registered architect shall be five dollars (\$5).

The fee to be paid for the restoration of an expired certificate of registration shall be five dollars (\$5).

The fee to be paid upon renewal of a certificate of registration shall be one dollar (\$1).

The fee to be paid by an applicant for a certificate of registration who is an architect registered or licensed under the laws of another state or territory of the United States, or of a foreign country or province, shall be fifteen dollars (\$15).

Sec. 15. The Department of Registration and Education shall adopt rules and regulations in accordance with the provisions of Section 60 of said Civil Administrative Code, and not inconsistent with this Act, to carry out fully and enforce the provisions of this Act.

Sec. 16. Each of the following Acts constitutes a misdemeanor punishable upon conviction by a fine of not less than twenty-five dollars (\$25) nor more than two hundred dollars (\$200) for each offense:

(a) The practice of architecture by any person or the advertising or putting out of any sign or card or other device which might indicate to the public that he or she is entitled

to practice as an architect, without a certificate of registration as a registered architect issued by the Department of Registration and Education of this State.

(b) The making of any wilfully false oath or affirmation in any matter or proceeding where an oath or affirmation is required by this Act.

(c) The affixing of a registered architect's seal to any plans, specifications or drawings which have not been prepared by him or under his immediate personal supervision.

(d) The violation of any provision of Section 11 of this Act.

All fines and penalties shall inure to the Department of Registration and Education of this State.

Sec. 17. The Department of Registration and Education shall keep a record open to public inspection at all reasonable times of its proceedings relating to the issuance, refusal, renewal, suspension or revocation of certificates of registration. This record shall also contain the name, place of business and residence, and the date and number of registration of each registered architect in this State.

Sec. 18. The following Acts are hereby repealed: "An Act to provide for the licensing of architects and regulating the practice of architecture as a profession," approved June 3, 1897, and in force July 1, 1897, and the following Acts amendatory thereof, to-wit: An Act approved April 19, 1899, and in force July 1, 1899. An Act approved May 16, 1905, and in force July 1, 1905, and an Act approved May 26, 1911, and in force July 1, 1911.

Sec. 19. This Act may be known and cited as "The Illinois Architectural Act."

GENERAL RULES GOVERNING EXAMINATIONS.

Section 1. All communications should be addressed to the Superintendent of Registration.

Sec. 2. Lists of successful applicants only will be announced.

Sec. 3. All examinations must be written in the ENGLISH language.

Sec. 4. Application and fee must be on file at least fifteen days before date of examination. All preliminary qualifications must be verified before examination.

Sec. 5. Unmounted photo, 3x5 inches, must accompany application. A duplicate of the photo must be presented at examination, both bearing certificate as to signature and identity by the two persons who signed the letters of recommendation accompanying photo.

Sec. 6. Applicants must present cards of admission on day of examination.

Sec. 7. Examinations will begin promptly at 8:30 A. M.

Sec. 8. Grades assembled at least fifteen days after close of examination.

Sec. 9. Applicants failing in practical work must retake all subjects.

Sec. 10. Applicants failing in written work allowed credit on all grades over 75% at the following examination only.

Sec. 11. Remittances should be made by postal or express money order or bank draft. **DO NOT SEND CURRENCY OR PERSONAL CHECK.**

A Salisbury Rubber Floor Covering for Every Purpose

Rubber Goods of

MANUFACTURERS



Every Description

CONTRACTORS



Saks Building, 840 N. Michigan Ave., Chicago
Holabird & Root, Architects

"VEL-MAR"
MARBLE-IZED
RUBBER
TILE

—
VELVET
INTERLOCKING
RUBBER
TILE

—
COVE BASE

—
PERFORATED
RUBBER
MATS

—
CORRUGATED
RUBBER
MATTING

—
MARBLE-IZED
RUBBER
RUNNERS

Salisbury's Rubber Tile is produced by our Chicago factory and installed by experienced, trained mechanics.

Single responsibility on material and installation insures definite guarantees of Salisbury floors.

Experienced personnel of our Building Equipment Dept. are available to furnish estimates and information relative to preparation of sub-floors and layouts.

W. H. SALISBURY & CO., Inc.

308-310 West Madison Street

Phone, Franklin 5744

CHICAGO, ILL.

REGISTRATION OF ARCHITECTS

STATE OF ILLINOIS

RULES AND REGULATIONS

General Statement

The Fifty-first General Assembly revised the law in relation to the regulation of the practice of architecture as a profession.

It is unlawful for any person to practice architecture or advertise or put out any sign or card or other device which might indicate to the public that he or she is entitled to practice as an architect, without a certificate of registration as a registered architect duly issued by the Department of Registration and Education. *The law provides that "no corporation shall be licensed to practice architecture."*

Any one, or any combination of the following practices constitutes the practice of architecture, namely: The planning or supervision of the erection, enlargement or alteration of any building or buildings or of any parts thereof, to be constructed for others. A building is any structure consisting of foundations, floors, walls, columns, girders, beams and roof, or a combination of any number of these parts, with or without other parts.

The professional features of the law are administered by a professional committee of architects, consisting of five persons, appointed from time to time by the Director of Registration and Education. The administrative provisions of the law are exercised by the Department of Registration and Education. The powers and duties of the professional committee are as follows:

1. To conduct examinations to ascertain the qualifications and fitness of applicants for registration, and pass upon the qualifications of applicants for reciprocal registration.
2. To prescribe rules and regulations for conducting examinations.
3. To decide the schools of architecture from which graduation will be accepted as the equivalent of two years of the prescribed office experience.
4. To conduct hearings on proceedings to revoke certificates of registration.

Applications

A person is qualified to receive a certificate of registration as a registered architect:

- (a) Who is at least twenty-one years of age.
- (b) Who has graduated from a high school or secondary school approved by the Department, or has completed an equivalent course of study as determined by an examination conducted by the Department, and has subsequently thereto completed such courses in mathematics, history and language as may be prescribed by the Department.
- (c) Who has had at least three years' experience in the office or offices of a reputable architect or architects. A certificate

of graduation from an approved school of architecture will be accepted as the equivalent of two years of the prescribed office experience; and

- (d) Who has passed an examination conducted by the Department to determine his fitness to receive a certificate of registration as a registered architect.

Examinations

Examinations of applicants for certificates of registration as registered architects are held at such times and places as the Department of Registration and Education may determine, and embrace the following subjects:

1. The planning, designing and construction of buildings.
2. The strength of building materials.
3. The principles of sanitation and ventilation as applied to buildings.
4. The ability of the applicant to make practical application of his knowledge in the ordinary professional work of an architect and in the duties of a supervisor of mechanical work on buildings.

The Department of Registration and Education may, by rule, prescribe additional subjects for examination.

All examinations are conducted in the English language without the use of an interpreter, and are divided into six sections, A, B, D, E and F.

Examination A—The Science of Planning and the Art of Designing Buildings. This examination is held the first day with a time allowance of eight hours continuous session, consisting:

First—Of a test in the science of planning, particularly with reference to practical, logical and economical arrangement; the securing of comfort and the safeguarding of life and health of the proposed occupants of the building. (Grade value 100.)

Second—Of a test in the art of designing, particularly with reference to orderly and consistent expression of purpose, logical meeting of conditions and pleasing harmonious presentation. It is not a test in a knowledge of historical styles. The grades will be based solely on the degree of perfection in meeting the before mentioned elemental requirements of good design. (Grade value 100.)

The test under "A" problem requires plans, elevations, sections and some detail drawings for a building the nature of which will be set forth in a program such as a well informed owner might be expected to give to an architect.

Time—8:30 A. M. to 4:30 P. M. en loge.

No reference books will be permitted.

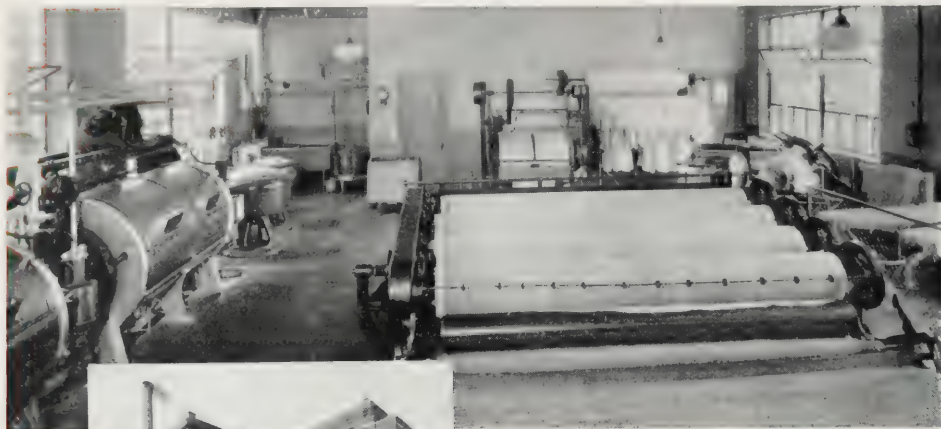
Examination B—Graphic Statics and Truss Design. This examination is held the morning of the second day with a time allowance of four hours continuous session. It consists of a test in the science of graphic

The American Laundry Machinery Co.

Sales Offices in all Principal Cities

Executive Offices: Norwood Station, Cincinnati, Ohio

Western Sales Offices: 633 S. Wabash Avenue, Chicago, Illinois



A view of the Illinois Masonic Hospital and its modern laundry. A planned-from-the-start department similar to dozens of fine institutional laundries which "American" engineers have helped to install.

The hospital and institutional laundry INDISPENSABLE... LOGICAL

YOU have noticed, no doubt, that practically every sizeable institution, nowadays, enjoys the benefits of having its own laundry. In the case of the splendid Illinois Masonic Hospital, Chicago, this indispensable department was incorporated in the original plans drawn up for the building. And may we add that, like the great majority of modern institutional laundries, it is an "American"-equipped department.

The experience of the engineers of The American Laundry Machinery Company covers the planning and installation of laundries, large and small, in every section of the United States. These men will be glad to furnish you with typical installation layouts and direct-experience information on laundry practices. No obligation, of course—working with you on your problems is a part of "American" service.

statics as applied to a truss problem, assuming that the preliminary designs of a building are complete, loads determined and diagram of truss settled upon. The candidate is required to determine the maximum stress in each member and its section, and to detail one or more designated joints. (Grade value 100.)

Time—8:30 A. M. to 12:30 P. M.

Free use of reference books is permitted.

Examination D—Specifications, Practice and Precedent. This examination is held the afternoon of the second day with a time allowance of three and one-half hours continuous session, consisting:

First—Of a test in the knowledge of specification writing, knowledge of the essence of the contract and of general architectural practice, as it pertains to relationship between the public, the owner, the contractor and the architect. (Grade value 80.)

Second—Of a test of general knowledge of the history of architecture and its place in social economy. (Grade value 20.)

Time—1:30 P. M. to 5:00 P. M.

No reference books may be used.

Examination E—Mechanics of Materials. This examination is held the morning of the third day, with a time allowance of four hours continuous session, consisting of a test in the science of determining the strength of materials and the applicant's knowledge of applied mechanics. The test requires the applicant to design the various parts of a structure and show ability to determine the safe, practical working sizes and shapes of footings, piers, columns, beams, girders and floors. Sketches will be furnished the applicant showing conditions and loading. (Grade value 100.)

Time—8:30 A. M. to 12:30 P. M.

Free use of reference books is permitted.

Examination F—Reinforced Concrete Design. This examination is held the afternoon of the third day, with a time allowance of three and one-half hours' continuous session consisting of a test in the science of computing stresses in reinforced concrete structures and involving exercises to show the applicant's knowledge of the correct design and detailing of reinforced concrete structural parts, such as footings, columns, girders, beams and floor slabs, assuming that the preliminary designs of the building are complete, loads determined, story heights and column spacing fixed. The candidate is required to compute stresses and detail parts which are safe, practical and economical for the purposes intended. (Grade value 100.)

Time—1:30 P. M. to 5:00 P. M.

Free use of reference books is permitted.

Grading of Examination Papers

Examination papers are graded as follows: The maximum allowed on Examination A is 200; on Examinations B, D, E, and F, 100 each. The grade given the applicant on the whole examination is obtained by dividing the total A, B, D, E, and F by six.

To be successful, an applicant must make a general average of 75 with no grade in any subject below 60. If an applicant fails in his first examination, he will be permitted, upon the payment of a second examination fee, to take a second examination in those subjects in which he fell below 75 at any regular examination within eighteen months from the date of the first examination. If the applicant fails in his second examination and desires to appear for a third, it will be necessary for him to file another examination fee and be examined in ALL subjects.

Reciprocity

Upon payment of the required fee, an applicant who is an architect, registered or licensed under the laws of another state or territory of the United States, or of a foreign

country or province, may, without examination, be granted a certificate of registration as a registered architect by the Department of Registration and Education in its discretion upon the following conditions:

(a) That the applicant is at least twenty-one years of age, of good moral character and temperate habits;

(b) That the requirements for the registration or licensing of architects in the particular state, territory, country or province were, at the date of the license, substantially equal to the requirements then in force in this State; and,

(c) That the applicant appears before the committee at one of its regular meetings with exhibits of his work.

Annual Renewal

Every registered architect who continues in active practice, shall annually, on or before the first day of July, renew his certificate of registration and pay the required renewal fee. Every license or certificate of registration which has not been renewed during the month of July in any year, shall expire on the first day of August in that year. A registered architect whose certificate of registration has expired may have his certificate restored only upon the payment of the required restoration fee.

Any architect registered or licensed in this State who has retired from the practice of architecture for a period of not more than five years, may have his certificate of registration renewed at any time within a period of five years after so retiring, upon making application to the Department for such renewal and upon payment of all lapsed renewal fees.

Fees

The fee to be paid by any applicant for an examination to determine his fitness to receive a certificate of registration as a registered architect is ten (\$10.00) dollars.

The fee to be paid by any applicant for a certificate of registration as a registered architect is five (\$5.00) dollars.

The fee to be paid for the restoration of an expired certificate of registration is five (\$5.00) dollars.

The fee to be paid upon renewal of a certificate of registration is one (\$1.00) dollar.

The fee to be paid by an applicant for a certificate of registration who is an architect registered or licensed under the laws of another state or territory of the United States, or of a foreign country or province, is fifteen (\$15.00) dollars.

Seal

Every registered architect shall have a seal, the impression of which shall contain the name of the architect and the words "Registered Architect, State of Illinois." He shall stamp with this seal all working drawings and specifications prepared by him or under his supervision.

Instruction to Candidates

All candidates must appear at 8:00 A. M. on the days set for the examination at the place designated on their admission cards. They must bring all necessary drawing instruments, a 24-in. T-square triangle, scales, thumb tacks, etc., for examinations A and B. For examinations D, E, and F, scales and triangles alone will be sufficient. The use of slide rules for mathematical calculations is permitted, but special slide rules for concrete and steel design are not to be used.

For the first day's work, applicants must bring six sheets of medium weight tracing paper 20 by 24 inches, and one sheet of heavy detail paper 20 by 34 inches. Candidates will not be allowed to leave the room on the first day, but may bring lunch.

The paper for other examinations will be furnished by the Department.



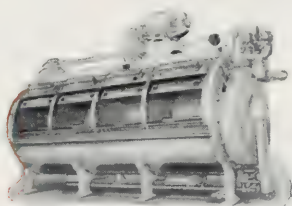
MODERN LAUNDRY MACHINERY AND DRY-CLEANING EQUIPMENT

FOR COMMERCIAL AND INSTITUTIONAL USE

PRODUCTS—Complete line of equipment including Washers, Extractors, Tumblers, Calenders, Ironers, Gladirons, Presses, Dryrooms, Curtain Stretchers, Finishing Machinery, and Automatic Dumps.

APPLICATIONS—For commercial laundries, dry-cleaning plants, hospitals, hotels, sanitariums, clubs, municipal laundering plants, and public institutions.

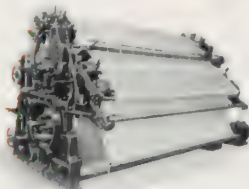
WASHING MACHINES—The General All-Metal Washer, 54"x120", Y-pocket type, will average an 800-pound load per run. It operates at high efficiency, delivering about 12.2 pounds of work per square foot of floor space. Equipped with Timken bearings, Alemite lubrication, one-lever control, gears-running-in-oil, and interlocking safety system. Motor or belt drive.



General All-Metal Washer, Type 54-Y,
Timken equipped.

Wood washers, all-metal washers, combination wood and metal washers, built in all sizes. General Black Metal Washer made expressly for dry-cleaning plants; wired for grounding static, and equipped with safety devices. Built for long service and low upkeep.

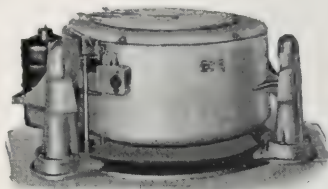
EXTRACTORS—Tolhurst Center-slung Extractor is built low and compact with specially designed supports. Runs smoothly with unbalanced load. Centrifugal clutch relieves starting strain. Easy to load or unload. Interlocked safety guards prevent starting while covers are open, and lock covers shut while running. Built in various sizes up to 60-inch diameter basket. This size especially suitable for dry-cleaning work in handling rugs.



General Calender cylinder-type,
with uniform pressure rolls.



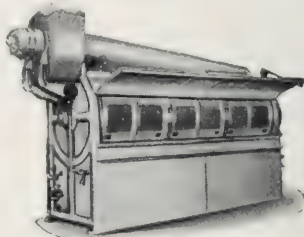
General Gladiron, an
independent unit for
hand-ironed finish.



Tolhurst Center-slung Extractor.
Special supports reduce vibration.

Tolhurst Self-balancing and Solid Curb Extractors furnished in a complete line of sizes, with all forms of drive from direct-connected motors to counter-shaft pulleys. Safety devices conform to all codes.

DRY-TUMBLERS—General Tumblers operate on the up-draft principle with air exhausted from top instead of blown from bottom. Perforated metal cylinder less abrasive than wire screen cylinders. Efficient in action and easy on garments. Easy temperature regulation and interlocked safety system. Belt driven or equipped with vapor-proof motors, for both fan and cylinder. Dry-cleaning Tumbler has explosion door and special safety devices. Highly economical in operation.



General Dry Tumbler with highly
efficient up-draft operation.

CALENDERS—Cylinder type with pneumatic pressure rolls. Both sides of goods ironed at once under uniform pressure. Hand-work quality insured on production basis. Motor compressor, 60 pounds, included in equipment.

GLADIRON—Electrically operated iron travels back and forth by means of endless belt. Complete control of iron is by mere touch of hand, eliminating all heavy labor in hand-ironing.

INFORMATION—Detailed specifications of all General Laundry Machinery will be sent promptly on request. Technical department maintained for supplying authentic data on production of various machines. Co-operation offered to builders and architects in planning installations for laundry and dry-cleaning plants.

GENERAL LAUNDRY MACHINERY CORPORATION

822 W. Washington Blvd., Chicago, U. S. A.

Factories: Chicago, Ill., Troy, N. Y., Green Island, N. Y., Columbia, Pa.

SALES OFFICES:

Chicago, Ill.
822 W. Washington Blvd.
Los Angeles, Calif.
1219 Santa Fe Ave.

Philadelphia, Pa.
53rd and Lansdowne Ave.
New York, N. Y.
183 Madison Ave.

Seattle, Wash.
165 Western Ave., West
Pittsburgh, Pa.
331 Grant Bldg.
San Francisco, Calif.
1128 Mission St.

Houston, Texas
Houston Merchants Exchange Bldg.
Toronto, Canada
No. 3 East Dundas St.

WGR 7438

Penalties

Each of the following acts constitutes a misdemeanor punishable upon conviction by a fine of not less than twenty-five dollars (\$25.00) nor more than two hundred dollars (\$200.00) for each offense:

(a) The practice of architecture by any person or the advertising or putting out of any sign or card or other device which might indicate to the public that he or she is entitled to practice as an architect, without a certificate of registration as a registered architect issued by the Department of Registration and Education.

(b) The making of any wilfully false oath or affirmation in any matter or proceedings where an oath or affirmation is required by this Act.

(c) The affixing of a registered architect's seal to any plans, specifications or drawings, which have not been prepared by him or under his immediate personal supervision.

(d) Neglect or failure of the holder of a certificate of registration to display it in a conspicuous place in his principal office, place of business, or place of employment.

(e) Neglect or failure of a holder of a certificate of registration to stamp with his seal all working drawings and specifications prepared by him or under his supervision.

All fines and penalties shall inure to the Department of Registration and Education.

Suspensions—Revocations

The Department of Registration and Education may refuse to renew, or may suspend, or may revoke, any certificate of registration for any one or any combination of the following cases:

(a) Gross incompetency.

(b) Recklessness in the construction of buildings or their appurtenances.

(c) Dishonest practice.

(d) When the architect has been twice convicted for a violation of any of the provisions of this Act.

(e) A person who has by false or fraudulent representation obtained or sought to obtain a certificate of registration as an architect.

All correspondence in regard to applications, examinations, etc., should be addressed to the Department of Registration and Education, Architects Division, Springfield, Ill.

Published by order of

DEPARTMENT OF REGISTRATION AND EDUCATION:

MICHAEL F. WALSH,
Director.

V. C. MICHAEL,
Superintendent of Registration.

STATES REQUIRING ARCHITECTURAL REGISTRATION

Information as to registration laws now in force in the following states may be obtained as follows:

Arizona—State Board of Registration for Architects, Phoenix.

California—State Board of Architecture, N. D. 537-538 Phelan Bldg., San Francisco; State Board of Architecture, S. D., 1124 Sun Finance Bldg., Los Angeles.

Colorado—State Board of Examiners of Architects, 616 C. A. Johnson Bldg., Denver.

District of Columbia—Board of Examiners of Registrars of Architects, 1707 Eye St., N. W., Washington, D. C.

Florida—State Board of Architecture, 32 West Forsyth Street, Jacksonville.

Georgia—State Board of Registration of Architects, Atlanta.

Hawaii—Territorial Board of Registration, Honolulu.

Idaho—Department of Law Enforcement, Boise.

Illinois—Department of Education and Registration, Springfield.

Indiana—State Board of Registration for Architects, Indianapolis.

Iowa—State Board for Registration of Architects, 810 Hubbell Bldg., Des Moines.

Louisiana—State Board of Architectural Examiners, Hibernia Bldg., New Orleans.

Michigan—State Board of Registration for Architects, 1048 Book Bldg., Detroit.

Minnesota—State Board of Registration for Architects, 605 New York Bldg., St. Paul.

Mississippi—The Mississippi State Board of Architects, Gulfport.

Montana—Board of Architectural Examiners, Bozeman.

New Jersey—State Board of Architects, 219 E. Hanover St., Trenton.

New York—State Board for Registration of Architects, Albany.

North Carolina—State Board of Architectural Registration, Greensboro.

North Dakota—State Board of Architecture, Bismarck.

Oklahoma—State Board of Examiners of Architects, 14 Court Arcade Bldg., Tulsa.

Oregon—State Board of Architectural Examiners, Portland.

Pennsylvania—State Board of Examiners of Architects, Harrisburg.

South Carolina—State Board of Architectural Examiners, Columbia.

South Dakota—State Board of Engineering and Architectural Examiners, Sioux Falls.

Tennessee—State Board of Architectural and Engineering Examiners, Nashville.

Utah—State Board of Architecture, Salt Lake City.

Virginia—State Board for the Examination and Certification of Architects, Professional Engineers and Land Surveyors, Lynchburg.

Washington—State Board for Registration of Architects, Olympia.

West Virginia—State Board of Examiners and Registration of Architects, Charleston.

Wisconsin—Board of Examiners of Architects, Madison.

Such laws are pending in Ohio and Missouri.



*Residence of Bertrand Rockwell, Kansas City, Missouri. Mary Rockwell Hook, Architect.
Roofed with IMPERIAL Mission Tiles, variegated.*

WHEN you specify IMPERIAL Roofing Tiles you enjoy that inner glow of satisfaction which comes from knowing that you have given your client the best.

To select a cheaper material is false economy, for these tiles assure a lifetime of beauty and protection without upkeep expense. Write for literature.

IMPERIAL Roofing Tiles

LUDOWICI-CELADON COMPANY

104 South Michigan Avenue · Chicago

565 Fifth Avenue · New York



NATIONAL COUNCIL OF ARCHITECTURAL REGISTRATION BOARDS

Explaining the Function, Scope, Service and Method of Operation of the National Council of Architectural Registration Boards

Introductory Statement.

1. Briefly stated, the Council constitutes a clearing house for the convenience of the registration authorities of the various states having laws regulating the practice of architecture. Its active membership is composed of such states. Its membership is not elected, but is constituted of those States whose registration authorities subscribe to its Constitution and By-Laws and pay the annual membership fee. No State which has a law regulating the practice of architecture can be denied membership in the Council, provided its legally constituted officials sign an application blank, pay the required membership fee, and deposit five copies of its Architectural Act and of the Rules and Regulations promulgated by its examining committee or board for the purpose of regulating examinations.

2. The franchise of the Council is inherent in its active members. In other words, the control of the Council is absolutely in the hands of the architectural registration authorities of the various States which are members of the Council, each State being entitled to only one vote, even though represented by several of its officials. The officers of the Council are elected by the active members to carry out their will.

I. Reciprocal Transfer of Registration.

It is expected that architects desiring reciprocal transfer of registration credit from one State to another will find it convenient and practical to effect this transfer through the medium of the National Council of Architectural Registration Boards. In most cases where this method is followed, the applicant will be saved the necessity of a personal appearance and examination before any examining committee other than that of his home State. While the Council does not guarantee the acceptance of all applicants who apply for transfer of registration through the Council, it is in a position to, and does, furnish State examining committees with the results of an unprejudiced and disinterested investigation of the applicant's moral, educational, and legal qualifications. With this data in hand the examining authorities in the State to which the applicant desires transfer are furnished evidence which is usually considered sufficient upon which to predicate judgment as to the applicant's eligibility for registration in accordance with the laws of that State.

II. Explanation and How to Avoid Delays.

The Council fully realizes that, often, time is a very important consideration with the applicant for architectural registration or for reciprocal transfer of architectural

registration, and it wishes to call architect's careful attention to some of the causes of delay and how delays may be avoided. To begin with, the applicant should appreciate the following facts:

1. Since Architectural Examining Boards, Commissions, or Committees for the various states are made up of men in private practice who serve without remuneration or at the most with a small per diem remuneration plus an allowance for actual expenses, they cannot and do not meet more often than once or twice a year; hence, if an application reaches the Secretary of such a Committee just after a meeting, there may be a long delay before the application can be taken up for consideration.

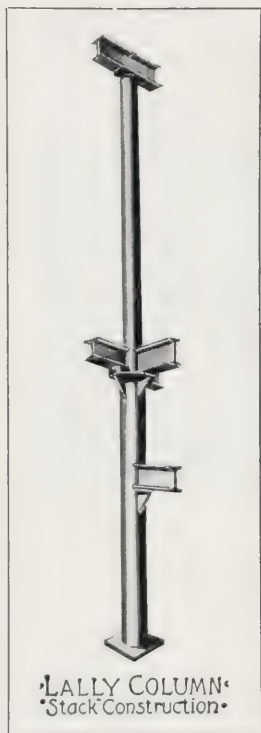
2. No Examining Commission can give intelligent consideration to an application for the transfer of registration or to the registration of an architect engaged in practice in another state where there is no law regulating the practice of architecture without a careful independent investigation of the applicant's credentials and his record in practice for reasons hereinafter set forth.

Fraud is sometimes practiced by the unscrupulous. In consequence, there is need of investigation in order to give protection to the public, also, in justice to the honest majority of applicants. The investigations conducted must be entirely independent of the applicant. In other words, diplomas, certificates, testimonials, letters, etc., when submitted by the applicant may be, and are in rare cases, fraudulent. There have been cases where certificates of registration in other states have been fraudulently altered. The same is true with reference to school certificates, society memberships, and testimonial letters presented by applicants from architects and clients. There have been cases where certificates of registration of men long since dead have been used as a basis for reciprocal transfer by those fraudulently posing as the original registrants. For this reason, identification photographs are now being insisted upon by registration authorities in most of the states.

3. Independent investigations must be conducted largely by correspondence, often over long distances, and, in a considerable number of cases to foreign countries, thus necessarily consuming considerable time. The Council's experience in conducting these independent investigations indicates that the average time is approximately six weeks. The minimum time is never less than four weeks, and the maximum time, three to six months, particularly in the case of foreign correspondence and where inaccurate ad-

LALLY COLUMNS

Have Been Specified by
Leading Architects
for Over Thirty Years



They are Steel-Pipe Concrete-Filled Building Supports of Maximum Strength and Minimum Size.



When fine appearance is desired LALLY COLUMNS are unequalled.



Many improvements in cap connections have recently been made to provide rigid attachment to floor beams, and to resist wind stresses.



Complete Information Sent upon Request

Lally Column Co. of Chicago

4001 Wentworth Ave.

Boulevard 5871-72

Chicago, Ill.

dressess are given and in the case of absent correspondents delaying replies to inquiries.

4. The evil consequences incident to the long time required for investigations can be eliminated if architects will file applications with the Council for investigations of their record before they desire transfer to any state, have the investigation completed and placed on file with the Council. Then if they suddenly wish transfer to a certain state the Council is in a position to immediately send a certified copy of an independent investigation of their record to the examining authorities of the state where they desire transfer. This record will be in such shape that it may be passed from member to member of the local Examining Committee by means of registered mail, so that their decision may be secured by letter-ballot, thus avoiding the great loss of time incident to waiting for a stated meeting of an Examining Board. In this way, transfer has often been effected in time not to exceed two or three weeks. Wise men engaged in interstate business are taking this precaution and finding it advantageous. It should be universal practice.

III. Investigations by the Council.

In investigating the applicant's record, the Council writes:

First, to the registrars or principals of the schools where he has received his training, asking for a certified copy of his school record while in attendance upon these various institutions.

Second, it writes to the examining authorities of his home State for a certificate as to his registration in that State and inquiring as to whether charges have ever been preferred against him involving recklessness or carelessness in the design or supervision of buildings or dishonest practice.

Third, inquiry is made of his former employers, if he comes under the junior classification, concerning his record and promise as an architectural employee.

Fourth, inquiry is also made from at least three of his clients as to his competency and faithfulness in the execution of trusts imposed in him.

Fifth, inquiry is made of at least three architects as to their knowledge of the character and competency of his practice.

Sixth, inquiry is also made of professional and technical societies as to his membership and his record for honorable practice.

When replies to these inquiries are received, they are carefully copied and certified to by the Executive Secretary of the Council and forwarded to the examining authorities where the architect desires registration.

The Council endorses no one and expresses no opinion whatsoever. It simply collects the information and forwards it for the judgment of the local examining committee.

IV. In Applying for Council Service.

To employ the services of the Council, for the purpose of obtaining reciprocal transfer

of registration credit from one state to another, request should be made of the Secretary of the National Council of Architectural Registration Boards, at 175 W. Jackson Blvd., Chicago, Illinois, for the furnishing of necessary blanks and instructions as to further procedure.

With this request should be embodied statements and enclosures in conformity with the following:

1. A par value, at Chicago, check or draft for Twenty Dollars (\$20.00) made payable to the "N. C. A. R. Boards," the required advance payment of the Council's prescribed fee to defray the expenses incident to an investigation of the applicant's record.

See Art. VIII.

2. A statement giving the state or states where the applicant is at present registered and in each case, the manner in which such registration was obtained, whether by "Exemption," "Reciprocal Exchange," "Written" or "Oral Examination"; the duration and subjects covered by each of the successful registration examinations enumerated, and the dates and official numbers of each registration.

3. A statement as to the number of years that the applicant has been engaged in the professional practice of architecture as a principal. It should be noted that employment in an architect's office as a foreman, draftsman, specification writer or superintendent is not acting as a principal or one of the principals in charge of an architect's office, neither is business as a building contractor or such contractor's superintendent, draftsman or estimator considered the practice of architecture as a principal.

A person may be considered a principal in the practice of architecture as a profession if he only serves a single client, on a salary or other basis, in an office maintained by such client, if it can be established that he was entirely responsible for and in complete control of the architectural work and administration of that office during the entire time enumerated "architectural practice as a principal," i. e., did he sign the work as architect and exercise control over those engaged on the design and supervision of the work executed, including the power of employment and discharge?

V. General Instructions.

1. Upon receipt of the before-mentioned statements and payment of fee, the Secretary of the National Council will forward to the applicant an Application Blank and an Information Blank which should be filled out by the applicant, certified to by a Notary Public and returned to the Council as a basis for its investigation. Too much emphasis cannot be laid on the importance of using great care in filling out the Information Blank and making the statements as completely comprehensive as space will permit.

2. Since the Information Blank must be reproduced in facsimile, it is very important that the ink used in filling in answers to the



FOLEY BETTER BUILT
AND HEATED GREENHOUSES



Builders of the most modern types of

GREENHOUSES, CONSERVATORIES SOLARIUMS and GLASS ENCLOSURES



Curved Eave 3-compartment Growing House with connecting
Propagating House and Rose House

Built for

Mr. Wm. C. Grunow at Majestic Lodge, Lake Geneva, Wisconsin
Messrs. Olsen & Urbain, Architects, Chicago, Illinois



Foley Greenhouses are found at many of the leading prominent estates throughout the country.

Standard Details, Suggestions and Specifications may be found in Sweet's Architectural Catalogue.

The Foley Greenhouse Mfg. Co.

Forest Park, Illinois

(A suburb of Chicago)

Chicago Phone, Austin 8164

Suburban Phone, Forest 1418

various questions shall be black opaque, susceptible to photographic or blue-print reproduction. Common drafting ink is the most practical. The typewriter may be used if the paper is backed with a fresh black carbon, so as to form a good blue-print negative. Actual dates of attendance at schools are important. Addresses of school principals, registrars, secretaries of societies, clients, and architectural references should be accurately given.

3. Much delay has resulted from failure to give this information correctly. Inaccurate or incomplete information only delays the completion of the record, as no record will be forwarded to the examining authorities of the State where the architect wishes transfer until the required number of references have been heard from.

4. Either at the time of sending the Application and Information Blanks to the applicant or at some time during the investigation of his references he will be informed by the National Council as to the amount of his preliminary fee which he must pay to the State examining authorities where he desires registration and, upon receipt of this information, he will forward to the Council a certified par value check covering the amount of that fee made out to the proper registration authorities of the State where he desires registration, as per instructions of the Council. This check will be held by the Council until applicant's record is finally completed, and will be forwarded to the State where he wishes registration along with the information collected concerning his record.

5. A film negative identification photograph of the applicant, with two (2) unmounted prints, each signed and certified to, shall be furnished the Council by the applicant at some time before its investigations are completed. Glass negatives are not acceptable.

VI. Additional Transfers.

Copies of the original credentials are preserved in the Council office and become a part of the applicant's permanent record. Should he desire to transfer to additional States, he may have this transfer facilitated through the offices of the Council by applying for a transfer in the same manner as in the case of the original application, except enclosing a fee made payable to the Council of Ten Dollars (\$10.00). In such cases, the Council will simply send a duplicate copy of his record to the additional State where applicant desires registration, except in cases where a long time has elapsed between the original investigation and the time of application for an additional transfer. The Council will make further investigation to ascertain if the applicant has continued to maintain the high standard indicated by the original investigation. Additional information thus obtained is embodied in the original record and procedure otherwise as in the first case.

VII. Remittances to State Boards.

The best method of making remittances to State Examining authorities is by means of the certified personal check of the applicant, adding the small exchange where this is required to the amount of the check, noting on the lower left-hand corner of the check the purpose for which this check is issued. This is a very much more satisfactory method of remittance than by use of bank draft, money order, or postal order, as, if certified, it is equally as safe to the state authorities receiving same as the bank draft.


It is no more expensive than the bank draft or postal money order, requires no longer time to secure same, presents concrete and exact evidence of payment, and the purpose for which payment is made. The applicant may then know by his returned check when his remittance has been cashed by the state to which it has been sent.

VIII. Concerning Fees.

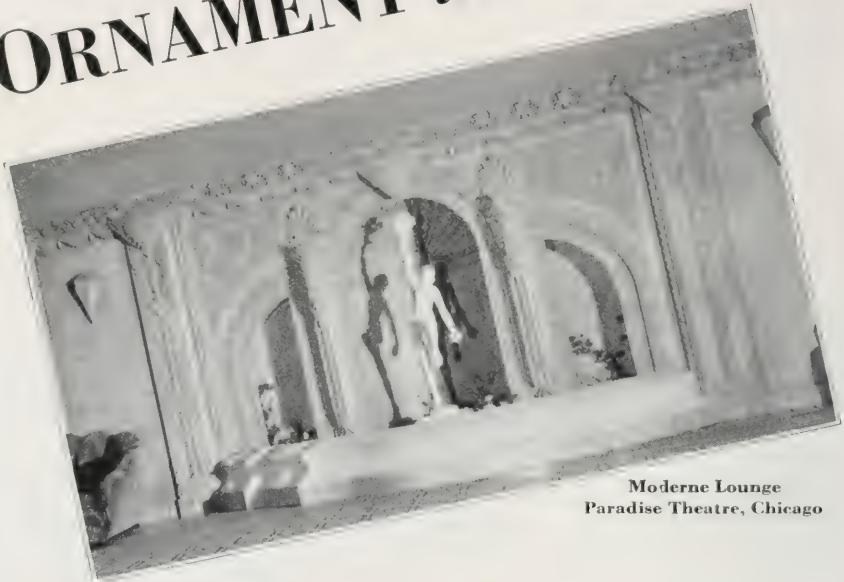
The fees charged by the Council barely defray the expenses of its investigations. The Council is an institution organized "not for profit." All Council fees are in addition to State examining and registration fees. Should complaint be urged that the fees charged by the Council constitute an excessive burden on architectural practitioners who wish to engage in interstate business, it should be pointed out that there is no requirement compelling architects to make use of the services of the Council. They are always at liberty to appear before the examining committee of the State where they wish to be registered by reciprocal transfer, submit their proofs, and receive registration or denial of registration in that State in accordance with the merits of their case. It should be pointed out to the architects that most examining committees meet not more than twice a year and that many examining committees meet only once a year and that by mutual understanding registration by reciprocal transfer cannot, except in very special cases, be made between member States except on the basis of a Council investigation or by the personal appearance of the applicant before the local examining committee at one of its regular or special meetings. Transportation and hotel expense would very quickly mount up to a sum in excess of the nominal fees charged by the Council for its work, particularly, when it is borne in mind that after the first investigation subsequent fees are only Ten Dollars per transfer.

IX. Standard N. C. A. R. Examinations.

Because of its close relationship with the various examining authorities, the Council is in a position to facilitate uniformity of examinations. Where legal restrictions do not permit the local examining committees to give examinations equal in stringency, to those recommended by the Council as just and proper, the Council with the co-operation of the local examining committees may arrange voluntary examinations meeting the minimum requirements recommended by the Council. The laws in the different States vary materially and probably always will vary. Since these laws affect examinations the legal examination requirements in different States may be expected to continue to differ. Some States emphasize preliminary education as of paramount importance and place very little credence in examinations. Other States emphasize the importance of



ORNAMENT in PLASTER



Moderne Lounge
Paradise Theatre, Chicago

John Eberson, Architect



A CATALOG SERVICE TO ARCHITECTS
Which Includes the Moderne



OUR CATALOGS CONTAIN A WEALTH
OF PERIOD DESIGN IN



*Ornamental Plaster
Composition for Wood Carving
Fire Places*

WRITE TODAY

ARCHITECTURAL DECORATING CO.

1600 South Jefferson Street

Phone Roosevelt 4330

CHICAGO

examinations as a greater consideration than the educational record. Some States are only concerned with the question of the applicant's proficiency in matters falling under the police power of the State (i. e., the conservation of life, health and property). Other States base their requirements on broad educational standards and value aesthetic skill as equal to skill in matter of safety to human life, conservation of property and protection of health. Many requirements are common to all States. Therefore, the successful passing of an examination in any State should eliminate further requirement for an examination on work passed in the State of first examination.

The Council has devised an examination standard which it has been pleased to designate as the "Standard N. C. A. R. Examination" and which is intended to cover the minimum requirements for registration in all States. The Council suggests the advisability of supplementing the regular examination of the State of applicant's residence with this additional examination. It is understood that, while the examination is conducted under the supervision of the National Council and in strict accord with the rules promulgated by that body, it is actually conducted by the State examining committee of the State of applicant's residence. Preliminary to such examinations, the applicant must apply to the Council and have his record in practice very carefully investigated, written up, and furnished to the local examining committee as part of the material which it must use in determining the applicant's right to the status, "Registered in Accord with the Standard N. C. A. R. Examination Requirements."

The "Standard N. C. A. R. Examination" is purely a voluntary examination. No one is compelled to take it and no one will be allowed to take it who does not seem to have had adequate preparation to justify such an examination. In the interests of fair play, large discretionary power and liberal instructions are given to the examining committee in determining the equivalent of prescribed preparation.

Junior Examinations

Junior applicants (i. e., men having had less than ten years' practice as principals), who have passed the regular State examination in their home States, are only required to pass a written examination covering the difference between their home State examination requirements and those of the National Council of Architectural Registration Boards; but they must submit evidence of attainment since entering practice and evidence of attainment before practice. Of course, if they have not been engaged in practice, they will only have to submit evidence of attainment before practice. But this fact should be emphasized—that no essential part of their records from the time that they left elementary school up until the date of their applications for examination shall be missed from the investigation. Baldly stated, they must never have been found guilty of dishonorable practice, recklessness, or carelessness in connection with the designing, erection, or supervision of buildings. Their preparation for practice must be shown to have been adequate and their practical skill in applying theoretical knowledge demonstrated, both by written examination and by practical experience.

Reproductions of the applicant's work in design are made a part of the record of the National Council and furnished to the State of transfer with each application for reciprocal transfer.

Senior Examination.

The "Standard N. C. A. R. Examination for those falling under the Senior classification (i. e., men having had ten or more years'

experience as principals) is based very largely on proved attainment in practice. The Council assumes that no competent man having had ten years' experience as a directing head of an architect's office should be entitled to take the status "Registered by N. C. A. R. Examination" who cannot demonstrate to the entire satisfaction of the examining jury that he has at some time during his practice actually been engaged in the competent performance of the five fundamental functions of an architect, namely: the preparation of preliminary studies, general drawings, specifications, details, and the general supervision of the work, including all incidental items of practice which go with the performance of these various functions. With this understanding, it might be possible for a man to have had an unusually complete academic and technical school preparation and yet fail in the "Senior Standard N. C. A. R. Examination," if it should be proved that he was unable to apply or never had applied at some time during his architectural practice his theoretical knowledge in the performance of each of the fundamental functions of an architect.

Applicant is required to furnish with his application for the "Senior N. C. A. R. Examination" eighteen illustrations, of reduced size, representative of the varying character of his work. These illustrations shall be presented either in the form of photographic film negatives with two prints of each or photo-static negatives and two prints of each. The sheets are to be the architectural standard size, 8½" x 11", each containing six illustrations, making a total of eighteen, on three sheets.

X. Application For Standard N. C. A. R. Examination and in General.

Should an applicant wish to take a Standard N. C. A. R. Examination he would proceed almost exactly in the same way as indicated in the foregoing upon making an application for reciprocal transfer, except that he shall include a fee of Twenty-five Dollars (\$25.00) to the Council instead of Fifteen Dollars. The Council will proceed to investigate his record in exactly the same way as set forth for the investigation of record in the case of reciprocal transfer, with the following exception, that when the record is received and the copy made, the original replies and the original application and the original information cover, certified to and forwarded to the State examining authorities in the State of the applicant's residence, together with instructions to the State Examining Committee as to the additional examinations which the applicant must take, over and above the regular State examination which he has already taken, in order to qualify under the provision, "Registered by Standard N. C. A. R. Examination." In due course, the applicant will be notified to appear before his own State Examining Committee and take the prescribed examination, which, if he passes creditably, will entitle him to the status, "Registered by Standard N. C. A. R. Examination," a status which would seem to entitle him to registration in any State without further examination and which would actually be the means of securing registration in most States having laws regulating the practice of architecture. It would mean that the applicant had the endorsement of the National Council of Architectural Registration Boards.

In both Senior and Junior cases, the applicant must furnish a small identification photograph of himself which will be printed on one of the sheets illustrative of his work. Copies of these illustrations are furnished by the Council to the authorities in the State of examination and to all transfer state authorities along with a certified copy of the other records.

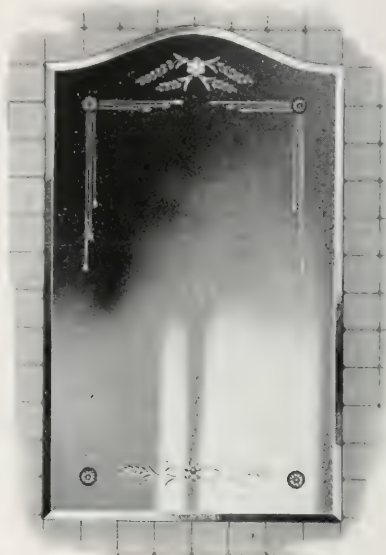
TWO POPULAR MODELS OF *Betzco "Whitekraft" Bathroom Cabinets*

The *Doge* Model

With Venetian Mirror

The distinguishing feature of this *Doge* Cabinet is the beautiful, handsome, and dignified Venetian Mirror with which it is equipped. This mirror fits closely to the wall, thereby, effectually concealing the cabinet of which it is a part.

The mirror is firmly attached to the steel door of the cabinet. The hinges are practically concealed and the customary glass knob has been left off in order to heighten the concealment of the cabinet. The mirror is hand cut, beveled at the edge and may be furnished with either a mitre line or engraved as illustrated.

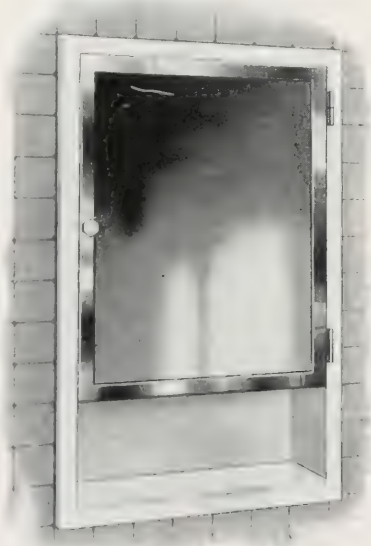


The *Patrician* Model

With Monel Metal Door Frame

This *Patrician* Model has found wide favor among builders who desire a bathroom cabinet that reflects charm and good taste. This cabinet may be had with a Monel Metal door frame, one that will not chip, stain or rust, as illustrated, or with a steel frame.

The *Patrician* is equipped with three glass shelves with rounded edges which effectually prevent round objects from rolling off of them. The mirror is made of the best quality American Plate and is evenly silvered. The cabinet is regularly finished in white lacquer, but can be secured in any finish desired. In spite of its superior design and appointments, this cabinet sells for a price that is astonishingly low.



*Send for descriptive literature on
"Whitekraft" Cabinets for Hotels
and Apartments*

FRANK S. BETZ COMPANY

HAMMOND, INDIANA

NEW YORK
348-52 W. 34th St.

DALLAS
Santa Fe Bldg.

CHICAGO
634 So. Wabash Ave.

LIST OF REGISTERED ARCHITECTS

Members of the Profession who will be Permitted to Practice in the State of Illinois.

Every means has been used to get a correct List of Licensed Architects who are permitted to practice Architecture in the State of Illinois for the ensuing year. The names have been compared with the Official Records of the State of Illinois.

CHICAGO

- Abel, Lester A., 7019 Merrill Ave.
 Ablamowicz, Sigmund V., 1859 W. Chicago
 Adler, David, 220 S. Michigan Ave.
 Aga, O. W., c/o Jarvis Hunt, 30 N. Michigan Ave.
 Ahlschlager, Walter W., 10 N. Clark St.
 Alexander, Isadore E., 64 E. Jackson Blvd.
 Allen, Alfred P., 225 N. Michigan Ave.
 Allen, James Roy, 410 S. Michigan Ave.
 Allerton, Oscar J., 6525 N. Campbell Ave.
 Allison, Lyman J., 115 S. Dearborn St.
 Almquist, Carl M., 118 N. LaSalle St.
 Alper, Max, 1214 N. Kedzie Ave.
 Alschuler, Alfred S., 28 E. Jackson Blvd.
 Anderson, Harold E., 7449 Prairie Ave.
 Anderson, Helge A., 308 W. Washington St.
 Anderson, Helmer Nels, 5948 Midway Parkway.
 Anderson, Russell A. M., 4770 Lincoln Ave.
 Anderson, William C., 5220 Kenwood Ave.
 Anderson, Hans L., 643 Barry Ave.
 Anis, Albert, 30 N. Dearborn St.
 Archer, Chas. S., 9 E. 79th St.
 Armstrong, John A., 127 N. Dearborn St.
 Ashby, George William, 1511 W. Jackson Blvd.
 Ashby, Wilbert B., 1511 W. Jackson Blvd.
 Bacci, Alexander H., 529 Aldine Ave.
 Bacon, James Earl, 7332 Phillips Ave.
 Bailey, Walter T., 3741 S. State St.
 Bannister, George S., 115 S. Dearborn St.
 Banse, Herbert G., 3811 Pine Grove Ave.
 Barfield, Norman D., 58 W. Washington St.
 Barfield, William G., 58 W. Washington St.
 Bargman, Ewald F., 1408 Jarvis Ave.
 Barrett, Fred L., 4220 N. Western Ave.
 Barrett, Fred Smith, 5714 W. Ohio St.
 Barry, Gerald A., 180 N. Michigan Ave.
 Barthel, Bernard, 3341 N. Hamilton Ave.
 Bartlett, Harry O., 6928 Oglesby Ave.
 Barton, F. M., 3815 W. Congress St.
 Baum, Isaac William, 1948 E. 73rd St.
 Baumeister, George E., 7817 Michigan Ave.
 Beaudry, Ralph L., 1444 E. 65th St.
 Beck, H. Frederic, 664 N. Michigan Ave.
 Beck, Willis J., 5060 Kenmore Ave.
 Bednarik, Jos., 1643 W. Garfield Ave.
 Beidler, Herbert B., 936 N. Michigan Ave.
 Bein, Maurice L., 100 N. La Salle St.
 Bellas, Charles, 617 Gary Place.
 Beman, Spencer S., 105 W. Monroe St.
 Bennett, A. J. T., 33 S. Clark St.
 Bennett, Edward H., 1800-80 E. Jackson.
 Benson, Arthur E., 5153 N. Clark St.
 Benson, Edward, 5153 N. Clark St.
 Berkson, Aaron, 3221 Douglas Blvd.
 Berlin, Robert C., 228 N. La Salle St.
 Bernard, Clifford S., 10300 S. Fairfield Ave.
 Bernham, F. M., 5257 Cottage Grove Ave.
 Bernhard, Wilhelm, 820 Tower Court.
 Betts, Wm. B., 32 W. Randolph St.
 Bialles, Theo. P., 4307 N. Keeler Ave.
 Bicknell, Alfred H., 3801 N. Hoyne Ave.
 Bieg, Harry K., 4820 N. Winchester Ave.
 Bischof, Jacob H., 100 W. Monroe St.
 Bishop, Thomas R., 35 S. Dearborn St.
 Bjork, David T., 228 N. La Salle St.
 Blake, Donald A., 6 N. Michigan Ave.
 Blondin, Edward A., 1859 E. 71st St.
 Blouke, Pierre, 80 E. Jackson Blvd.
 Bodholdt, Arne, 104 S. Michigan Ave.
 Boehm, Rudolph P., 7527 Cottage Grove
 Boener, F. C., 112 W. Adams St.
 Bohasseck, Charles, 900 N. Michigan Ave.
 Bonnevier, Clarence J., 8520 S. May St.
 Bollenbacher, J. C., 333 N. Michigan Ave.
 Booton, Joseph F., 190 N. State St.
 Bouchard, Lewis C., 205 W. Wacker Drive.
 Bourke, Robt. E., 1401—39 S. La Salle St.
 Bowen, Howard, 549 W. Washington St.
 Bowman, Irving H., 952 N. Michigan Ave.
 Braband, Frank J. E., 901 Wrightwood Ave.
 Brand, Herbert A., 400 N. Michigan Ave.
 Brandt, Robert, 64 E. Jackson Blvd.
 Braucher, Ernest N., 228 N. La Salle St.
 Braun, George, Jr., 3019 N. Kenneth Ave.
 Braun, Isadore H., 19 S. La Salle St.
 Braun, Wm. T., 58 E. Washington St.
 Bright, Jasper T., 6310 Diversey Ave.
 Bristle, Joseph H., 160 N. La Salle St.
 Britton, Frank, 836 W. 78th St.
 Brown, Arthur Geo., 3805 Ravenswood Ave.
 Brown, Arthur Robinson, R. 1461, 38 St. Dearborn St.
 Bruns, Benedict J., 1951 Irving Park Blvd.
 Brydges, E. Norman, 300 W. Adams St.
 Buchsbaum, Emanuel V., 6930 South Shore Drive.
 Buckett, Arthur C., 1753 Howard St.
 Buckley, Geo. H., 2237 W. 108th Place.
 Buerger, A. J., Jr., 5515 W. Division St.
 Bullock, Edwin C. A., 190 N. State St.
 Burger, Walter David, 3800 Sheridan Rd.
 Burgess, Ralph R., 39 S. La Salle St.
 Burnham, Daniel H., Jr., 160 N. La Salle
 Burnham, Hubert, 160 N. La Salle St.
 Burns, James, 205 W. Wacker Drive.
 Buss, Truman C., Jr., 7845 S. Eggleston
 Byrne, Francis B., 104 S. Michigan Ave.
 Cabeen, Richard McP., c/o Holabird & Root, 333 N. Michigan Ave.

"The Best - always"

Telephone Seeley 1164

THE EDWARD MOORE ROOFING CO.
ROOFING AND WATERPROOFING CONTRACTORS

ASPHALT MASTIC FLOORING

2729-31 West Madison Street

CHICAGO, ILL.

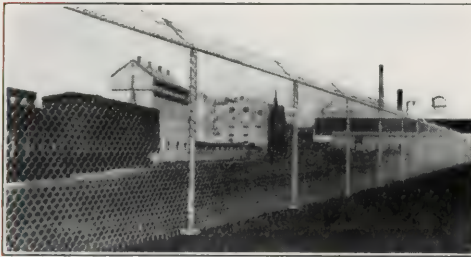
Cable, Max Lowell, 220 S. State St.
 Camburas, Peter E., 123 W. Madison St.
 Capraro, Alexander V., 7 S. Dearborn St.
 Carlson, Elmer C., 7910 Cottage Grove Ave.
 Carlson, Richard J., 82 W. Washington St.
 Carnegie, Wm. G., 228 N. Clark St.
 Carey, James L., 5308 Washington St.
 Carlburg, Ralph H., 1408 Carmen Ave.
 Carpenter, Martin R., 176 W. Adams St.
 Carr, Charles Alban, 529 Belden Ave.
 Carr, George Wallace, 333 N. Michigan
 Cauley, Frank William, 1619 Howard Ave.
 Cerny, Jerome J., 1444 S. Crawford Ave.
 Cerny, Otto F., 236 N. Clark St.
 Chance, James H., 7832 Drexel Ave.
 Charles, Walter T., 155 N. Clark St.
 Chase, Frank D., 720 N. Michigan Ave.
 Chatten, Melville C., 160 N. La Salle St.
 Chayes, Frank, 1334 Rosedale Ave.
 Cheney, Howard Lovewell, 80 E. Jackson Blvd.
 Childs, Frank A., 720 N. Michigan Ave.
 Chladek, Arthur L., 6428 Drexel Ave.
 Christensen, Hans C., 7312 Emerald Ave.
 Christensen, Eli, 6943 Indiana Ave.
 Christensen, Charles Werner, 2454 Farwell St.
 Christensen, Hans C., 222 W. Adams St.
 Christiansen, Roy T., 360 N. Michigan Ave.
 Chubb, John D., 109 N. Dearborn St.
 Civkin, Victor, 3025 Cortland St.
 Clark, Edwin H., 8 E. Huron St.
 Clark, Leslie Doane, 3351 W. Ohio St.
 Clark, Robert C., 7218 Harvard Ave.
 Clark, Wm. Jerome, 836 S. Michigan Ave.
 Cobb, William H., 123 W. Madison St.
 Coffin, Arthur S., 6 N. Michigan Ave.
 Cohen, Isadore, 1505—53 W. Jackson Blvd.
 Cohen, Joseph, 160 N. La Salle St.
 Colean, Miles L., 203 N. Wabash Ave.
 Coleman, Linza F., 7517 Cornell Ave.
 Comm, Benjamin Albert, 20 W. Jackson Blvd.
 Conley, Walter, 6 N. Michigan Ave.
 Conner, George D., 435 N. Michigan Ave.
 Conners, William Joseph, 3328 Wilson Ave.
 Cook, Norman W., 5842 Wayne Ave.
 Cooke, Thomas E., 44 N. Waller Ave.
 Coolidge, Charles A., 134 S. La Salle St.
 Corse, Raymond O., 64 E. Lake St.
 Coughlen, Gardner C., 1923 Calumet Ave.
 Cowles, Knight C., 203 N. Wabash Ave.
 Cozad, Fred Paul, 134 N. La Salle St.
 Croft, Ernest B., 112 W. Adams St.
 Cromelius, John S., 108 E. Oak St.
 Crosby, Wm. S., 6 N. Michigan Ave.
 Crowen, Samuel N., 8 S. Michigan Ave.
 Culver, Harry K., 1365 Greenleaf Ave.
 Cumming, Ralph W., 3155 S. Michigan Ave.
 Cummings, Raymond H., 7446 N. Seeley Ave.
 Dalsey, Harry I., 64 W. Randolph St.
 Davey, John Jeffrey, 431 S. Dearborn St.
 Davidson, Frank E., 53 W. Jackson Blvd.
 Davis, Zachary T., 400 N. Michigan Ave.
 Dean, Arthur R., 205 W. Wacker Drive.
 De Golyer, Robt. S., 307 N. Michigan Blvd.
 Del Campo, Scipione, 2955 N. Kilpatrick
 De Money, Frank O., 30 N. La Salle St.
 De Muth, John J., 612 N. Michigan Ave.
 Dennis, Charles A., 179 W. Washington St.
 Dewey, Charles, 4342 Drexel Blvd.
 Dillard, Frank G., 205 W. Wacker Drive.
 Dinkelberg, Fred'k P., 400 N. Michigan Ave.
 Dippold, Albert P., 3948 Cottage Grove Ave.
 Doerr, Harold F., 11006 S. Michigan Ave.
 Doerr, Jacob F., 11006 S. Michigan Ave.
 Doerr, Wm. Phillip, Jr., 11006 S. Michigan
 Doerr, Wm. P., 28 E. Jackson Blvd.
 Doll, Clarence W., 118 E. 26th St.
 Dougherty, Floyd E., 35 N. Dearborn St.
 Dowling, Edward F., 646 N. Michigan Ave.
 Drainie, John G., 32 W. Randolph St.
 Drielsma Arthur J., 1033 Loyola Ave.
 Dubin, George H., 14 W. Washington St.
 Dubin, Henry, 14 W. Washington St.
 Duckworth, John S., 20 W. Jackson Blvd.
 Dunning, Hugh B., 1210, 310 S. Wabash Ave.
 Dunning, N. Max, 310 S. Wabash Ave.
 Durkee, Arthur R., 35 W. 74th St.
 Dwen, Robert G., 8 E. Huron St.
 Dyer, Scott C., 38 S. Dearborn St.
 Ehmann, Wm. Frederick, 140 S. Dearborn
 Ehresmann, Delbert D., 1515 Howard St.
 Eich, George B., 104 S. Michigan Ave.
 Eichberg, S. Milton, 64 Randolph St.
 Eichenbaum, Edward E., 7558 Crandon Ave.
 Ekberg, Arthur B., 2821 E. 80th St.
 Ellert, Frank J., 161 E. Erie St.
 Elmslie, Geo. C., 122 S. Michigan Ave.
 Erickson, Allen E., 7 W. Madison St.
 Erickson, Carl A., 104 S. Michigan Ave.
 Ermeling, Ralph W., 58 E. Washington St.
 Esser, Curt A., 38 S. Dearborn St.
 Esser, Paul F., 6164 N. Hoyne Ave.
 Ewer, Warren B., 5531 Sheridan Rd.
 Fairclough, Stanley D., 809 Exchange St.,
 U. S. Yards.
 Falls, Alexander S., 50 S. La Salle St.
 Faro, Robert Vale, 6572 Lakewood Ave.
 Farrier, Clarence W., 160 N. La Salle St.
 Faulkner, Chas. D., 307 N. Michigan Ave.
 Fellows, Wm. K., 814 Tower Court.
 Ferrenz, Tirrell John, 720 N. Michigan Ave.
 Fielder, Fred A., 118 E. 26th St.
 Finck, Sidney C., 35 S. Dearborn St.
 Finlayson, Frank L., 910 S. Michigan Ave.
 Fischer, Frederick William, 9129 Commer-
 cial Ave.
 Fischer, John B., 140 S. Dearborn St.
 Fisher, Albert J., 2001 Greenleaf Ave.
 Fisher, Joseph G., 2001 Greenleaf Ave.
 Fishman, M. Maurice, 228 N. La Salle St.
 Flaks, Francis A., 1956 S. Springfield Ave.
 Flesch, Eugene W. P., 5121 Kenwood Ave.
 Fletcher, Robert C., 179 W. Washington St.
 Flinn, Raymond W., 1412-8 S. Dearborn St.
 Floto, Julius, 176 W. Adams St.
 Fogel, Reuben W., 2329 Winnemac Ave.
 Foltz, Frederick C., 510 N. Dearborn St.
 Fortin, Joseph T., 600 Blue Island Ave.
 Foster, Winslow H., 9238 Pleasant Ave.
 Fournier, Lawrence A., 5304 Kenwood Ave.
 Fox, Elmer J., 104 S. Michigan Ave.
 Fox, John J., 38 S. Dearborn St.



Cyclone Safeguard Chain Link Fence for estates, clubs, public and private grounds.



Cyclone Wrought Iron Fence and Gates.



Cyclone Invincible Chain Link Fence for industrial uses.



Cyclone Majestic Chain Link Fence for city and suburban residences.

*The only Chain Link Fence made entirely of copper-bearing materials—
for maximum endurance*

Cyclone Fence

**In Wire and
Wrought Iron**

Built for Any Purpose

Cyclone Fence is America's standard for public and private grounds; city, suburban, and country homes; parks, churches, cemeteries; schools, playgrounds, athletic fields; factories, railway and electrical property, and all industrial uses. Also for tennis court enclosures and backstops, bird and animal cages, poultry enclosures, kennels, etc.

Cyclone Chain Link Fence is distinctive in design, strong-built for lifetime property protection. Cyclone Wrought Iron Fence is dignified, imposing in its rugged simplicity. Built in handsome standard designs, also in special designs from architects' drawings.

Cyclone Cooperation with Architects

Competent fence engineers are available for consultation. No obligation. Blueprints of construction details mailed on request. Cyclone General Catalog No. 100, including 12 pages of specifications, should be in active use in every architect's office.

WE ERECT FENCE ANYWHERE



The Mark of
Dependable
Property
Protection

CYCLONE FENCE COMPANY

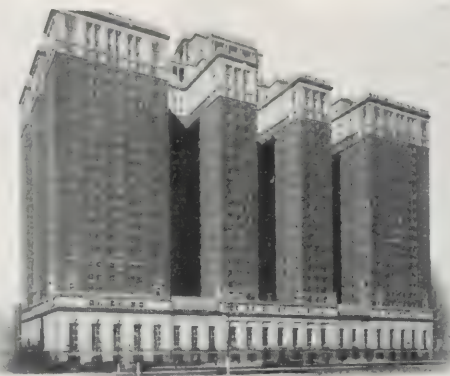
Main Offices: Waukegan, Ill.
Chicago—Phone: Franklin 0116
C. F. Co. 1927

Fox, William Paul, 38 S. Dearborn St.
 Foy, Wm. D., c/o Holabird & Root, 333 N. Michigan Ave.
 France, Roy F., 155 N. Clark St.
 Franklin, Robert L., 160 N. La Salle St.
 Frazier, Clarence E., 64 W. Randolph St.
 Frazier, Walter S., 75 E. Wacker Drive.
 Freiberg, Frederick A., 6809 Cornell Ave.
 Friedman, Raphael N., 28 E. Jackson Blvd.
 Frodin, Rube S., 808-30 N. Michigan Ave.
 Frommann, Emil H., 64 W. Randolph St.
 Frost, Charles S., 105 S. La Salle St.
 Frost, Harry Talfourd, 1800 Railway Exch.
 Fry, Frank L., 140 S. Dearborn St.
 Fuchs, Frank Joseph, 2619 Sayre Ave.
 Fugard, John Reed, 219 E. Superior St.
 Fuhrer, Eugene, 64 W. Randolph St.
 Fullenwider, Arthur E., 7209 Harvard Ave.
 Fuller, Ravilo Franklyn, 6 N. Michigan Ave.
 Furst, Wm. H., 127 N. Dearborn St.
 Fyfe, James L., 225 N. Michigan Ave.
 Gallup, Harold E., 646 N. Michigan Ave.
 Garden, Hugh M., 104 S. Michigan Ave.
 Gassman, Andrew P., 143 N. Lorel Ave.
 Gatterdam, Fred E., 6307 Holbrook Ave.
 Gauger, Wm., 36 W. Randolph St.
 Gaul, Christopher L., 228 E. Superior St.
 Gaul, Hermann, 228 E. Superior St.
 Gemeny, Blaine B., 8050 South Park Ave.
 Gerber, Arthur U., 20 W. Jackson Blvd.
 Gerding, Louis H., 6958 Hillside Ave.
 Gerhardt, Paul, 64 W. Randolph St.
 Gerhardt, Paul, Jr., 64 W. Randolph St.
 Gibson, Bayard K., 624 S. Michigan Ave.
 Gliatto, Leonard A., 343 S. Dearborn St.
 Glicken, Maurice Jerome, 30 N. Dearborn St.
 Glube, Harry, 360 N. Michigan Ave.
 Goldman, Joseph, 7405 Bennett Ave.
 Goodman, Wm. C., 2932 W. Adams St.
 Gormley, James R., 1502 Archer Ave.
 Graham, Ernest R., 80 E. Jackson Blvd.
 Granger, Alfred H., 333 N. Michigan Ave.
 Graven, Anker S., 100 N. La Salle St.
 Greenfield, Geo. H., 6023 Kenwood Ave.
 Greengard, Bernhard C., 4741 Malden Ave.
 Gregg, John Wyatt, 1315 Astor St.
 Gregori, Raymond, 134 N. La Salle St.
 Griesser, Richard, 64 W. Randolph St.
 Griser, Louis Keith, 506 S. Wabash Ave.
 Grotz, Chas. J., 3825 N. Cicero Ave.
 Grunsfeld, Ernest A., Jr., 435 N. Michigan
 Gubbins, Wm. F., 4059 W. Monroe St.
 Gurney, Paul B., 1234 N. State St.
 Guenzel, Louis, 879 N. State St.
 Gylleck, Elmer A., 10 N. Clark St.
 Haagen, Paul T., 155 N. Clark St.
 Hagerup, Leonard O., 6836 Olcott Ave.
 Hahn, Stanley W., 210 E. Ohio St.
 Hale, Robert S., 123 Bassford Ave.
 Hall, Eric E., 123 W. Madison St.
 Hall, Emery Stanford, 175 W. Jackson Blvd.
 Hall, Gilbert P., 333 N. Michigan Ave.
 Hall, Lincoln N., 7 W. Madison St.
 Hallberg, L. G., 116 S. Michigan Ave.
 Halperin, Casriel, 19 S. La Salle St.
 Hamilton, John L., 814 Tower Court.
 Hammett, Ralph W., c/o Hall, Lawrence
 & Ratcliffe, 123 W. Madison St.
 Hammond, Charles Herrick, 160 N. La
 Salle St.
 Hanselmann, Herman, 2542 Mont Clare
 Hansen, Paul, 4646 Magnolia Ave.
 Hanson, Herbert Carl, 7956 Aberdeen St.
 Happell, Otto Gottlieb, 800 W. North Ave.
 Harlev, William H., Jr., 64 W. Randolph
 Harris, Mandel H., 228 N. La Salle St.
 Harris, Ralph C., 190 N. State St.
 Haselhuhn, Robert G., 3985 Milwaukee Ave.
 Hatzfeld, Clarence, 7 S. Dearborn St.
 Hauber, Carl, 25 E. Jackson Blvd.
 Hawk, A. T., 803 La Salle St., R. R. Station.
 Hecht, Albert S., 228 N. Wells St.
 Heda, Arthur M., 123 W. Madison St.
 Hegsted, Martin A., 4630 Altgeld St.
 Heimbeck, Walter C., 1736 W. 102nd St.
 Heinz, Lorenz H., 453 W. 62nd St.
 Henderson, Charles C., 105 S. La Salle St.
 Henshien, H. Peter, 1637 Prairie Ave.
 Herter, John T., 2638 Fargo Ave.
 Hetherington, John T., 33 S. Clark St.
 Hetherington, Murray D., 33 S. Clark St.
 Hettinger, Robert J., 4708 Dover St.
 Heun, Arthur, 6 N. Michigan Ave.
 Higgins, Edgar J. S., 7628 Bosworth Ave.
 Hild, Edward G., 222 E. Ontario St.
 Himmelblau, A. L., 30 N. Dearborn St.
 Hirschfield, Leo S., 228 N. La Salle St.
 Hocke, John, 1604 E. 79th St.
 Hodgdon, Charles, 134 S. La Salle St.
 Hodgdon, Frederick M., 307 N. Michigan Ave.
 Hodgdon, John M., 134 S. La Salle St.
 Hoffman, Wm. L., Jr., 6407 South Park Ave.
 Hogenson, Edward A., 5818 Magnolia Ave.
 Holabird, John Augur, 333 N. Michigan
 Holcomb, F. Morse, 520 N. Michigan Ave.
 Holmboe, Leonard C. B., 3426 E. 89th St.
 Holmes, Morris G., 8 S. Dearborn St.
 Holsman, Henry K., 307 N. Michigan Ave.
 Hood, Raymond M., 431 N. Michigan Ave.
 Hooper, Wm. T., 879 N. State St.
 Hoskins, John M., 2837 W. Madison St.
 Hotton, Bartholomew J., 2680 Eastwood
 Houlihan, Raymond F., 64 W. Randolph St.
 Howell, John Mead, 431 N. Michigan Ave.
 Hubbard, Archie H., 38 S. Dearborn St.
 Hubbard, Bert Charles, 9911 S. Damen St.
 Huber, Julius H., 2039 Greenleaf Ave.
 Hughes, Andrew F., 7012 Eggleston Ave.
 Hull, Denison B., 210 E. Ohio St.
 Hunt, Jarvis, 30 N. Michigan Ave.
 Hunter, Herman T., 7425 Phillips Ave.
 Hussander, Arthur F., 25 N. Dearborn Ave.
 Huston, Sanford K., Jr., 1163 E. 54th Place.
 Huszagh, Ralph D., 6 N. Michigan Ave.
 Hyde, Robert M., 8 S. Dearborn St.
 Hyland, Paul V., 64 E. Lake St.
 Ingram, Horace, 5838 Stony Island Ave.
 Irwin, Edgar S., 2700 E. 78th St.
 Irwin, Howard E., 161 E. Erie St.
 Isensee, Frederic M., 8201 Harper Ave.
 Jacobs, Arthur, 160 N. La Salle St.
 Jansson, Edward F., 740 Rush St.
 Jenkins, Austin D., 400 N. Michigan Ave.
 Jensen, Clarence A., 310 S. Wabash Ave.
 Jensen, Elmer C., 39 S. La Salle St.
 Jensen, Jens J., 1105 Lawrence Ave.
 Jillson, B. H., 222 W. Adams St.

At the world's largest hotel—

NO test could be more severe, no service demands are more exacting than those of hotels. The constant flow of travelers are ever critical, always ready to complain to the management of the slightest imperfection of service.

No greater compliment could be extended Carbondale, than the selection of its refrigeration equipment for The Stevens—the World's largest hotel.



The Stevens, Chicago, Ill.

The Stevens is completely Carbondale equipped, the 500 tons of refrigeration being supplied by two 125 ton compression machines and two 125 ton absorption machines.

Six different loads are carried continuously and it is essential that there be no interruption in any one of these services.

- 1—the cooling and conditioning of 85,000 cubic feet of air per minute.
- 2—the freezing of 25 tons of ice daily.
- 3—the cooling of the circulating drinking water for the 3000 rooms.
- 4—the cooling of 70 refrigerators.
- 5—the cooling of storage rooms.
- 6—the freezing of 120 quarts of ice cream every hour.

The confidence which the Stevens has in Carbondale equipment is based on past performance. Carbondale Refrigeration has proven its merit during more than 35 years of service to every business and industry that uses refrigeration.

Our engineering department will gladly co-operate in the economical application of refrigeration for your particular needs. You incur no obligation by availing yourself of this service.

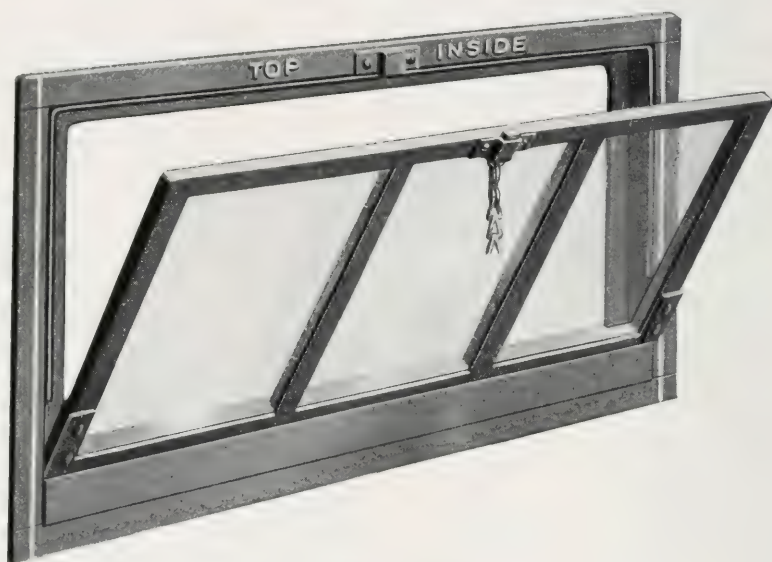
THE CARBONDALE MACHINE CO. CARBONDALE, PA.

Chicago Office: 222 W. Kinzie St.
Phone Superior 2055

Branches in principal cities

Johnck, Frederick, 140 S. Dearborn St.
 Johnson, Benj. L., 165 E. Wacker Dr.
 Johnson, Carl J., 5124 N. St. Louis Ave.
 Johnson, Elmer A., 161 E. Erie St.
 Johnson, Harry Nels, 4231 N. Robey St.
 Johnson, Harold T., 5054 N. Winchester
 Johnson, Otis Floyd, 6016 Ellis Ave.
 Johnson, Reuben Harold, 5153 N. Clark St.
 Johnson, Robert U., 1712 N. Francisco Ave.
 Johnston, William K., 6805 Yale Ave.
 Johnstone, Percy T., 35 E. Wacker Drive.
 Jones, Wm. C., 11 S. La Salle St.
 Joy, Samuel Scott, 180 N. Michigan Ave.
 Kallenbach, Henry, Jr., 3426 N. Hamilton
 Kandl, Norman N., 7905 Cottage Grove Ave.
 Karlson, Joseph A., 8018 Rhodes Ave.
 Kendall, David Alden, 7203 Merrill Ave.
 Kingsley, George S., 109 N. Dearborn St.
 Kirkpatrick, Robert A., 2352 E. 70th St.
 Klaber, Eugene H., 100 W. Monroe St.
 Klafter, David Saul, 100 N. La Salle St.
 Klafter, Joseph H., 127 N. Dearborn St.
 Klamt, Edward A., 713 Wrightwood Ave.
 Klein, William J., 228 N. La Salle St.
 Klekamp, Bernard R., 180 N. Michigan Ave.
 Klewer, Arthur, 220 S. Michigan Ave.
 Klewer, Geo. W., 123 W. Madison St.
 Kline, Edward L., 6727 Paxton Ave.
 Knapp, George Arnold, 605 W. Washington
 St.
 Knickerbocker, Earl B., 327 N. Parkside
 Knox, Arthur H., 140 S. Dearborn St.
 Knudsen, Harold, 5363 Crystal St.
 Kobylanski, Joseph L., 605 N. Michigan
 Kocher, Jacques J., 6405 S. Halsted St.
 Koenigsberg, Nathan, 155 N. Clark St.
 Kohfeldt, Walter G., 180 N. Michigan Ave.
 Koll, Henry C., 2155 Elston Ave.
 Komar, Morris L., 7 S. Dearborn St.
 Kopp, Joseph Diermar, 228 N. La Salle St.
 Koppel, Maurice G., 2559 W. Division St.
 Koster, John L., 184 W. Washington St.
 Kramer, William F., 608 S. Dearborn St.
 Krausch, Walter T., 547 W. Jackson Blvd.
 Krause, Edmund R., 5349 Sheridan Rd.
 Krieg, Wm. G., 176 W. Adams St.
 Kroman, M. Louis, 134 N. La Salle St.
 Kuehne, Carl Oskar, 1572 N. Halsted St.
 Kupfer, Otto A., 1865 Millard Ave.
 Kurzon, Bernard R., 105 W. Monroe St.
 Lampe, Clarence W., 155 N. Clark St.
 Lane, Harry Leonard, 225 N. Michigan
 Lang, Louis A., 4221 N. Kedvale Ave.
 Langille, Louis E., 7516 N. Parkhurst Ave.
 Larmon, Philip, 6810 Euclid Ave.
 Larsen, Emil L., 5131 N. Lincoln St.
 Larson, Godfrey E., 5154 N. Clark St.
 Lautz, William H., 806 W. 79th St.
 Lawrence, Albin, 123 W. Madison St.
 Layer, Robert, 134 N. La Salle St.
 Leavell, John C., 6606 University Ave.
 Ledebuhr, Arthur E., 7203 Constance Ave.
 Lehle, Louis, 502 Aldine Ave.
 Lenske, Charles H., 3912 N. Central Ave.
 Lester, Bemis, 6966 N. Hillside Ave.
 Levinson, Mark B., 4501 N. Kimbark Ave.
 Leviton, Morton, 38 S. Dearborn St.
 Levy, Alexander L., 228 N. La Salle St.
 Lewin, Edw. P., 1801-105 S. LaSalle St.
 Lewis, Jacob, 64 W. Randolph St.
 Lichtmann, Samuel A., R. 900-333 N. Michi-
 gan Ave.
 Liebert, Hans T., 1321 Pratt Blvd.
 Liedberg, Hugo J., 2349 Devon Ave.
 Lindblad, Alfred G., 155 N. Clark St.
 Lindeberg, George L., 30 N. La Salle St.
 Lindquist, Frederick, 179 W. Washington.
 Lindquist, Joseph B., 228 N. La Salle St.
 Lindstrand, John A., 4000 W. North Ave.
 Lindstrom, R. S., 228 N. La Salle St.
 Liska, Charles O., 38 S. Dearborn St.
 Liska, Emil, 38 S. Dearborn St.
 Llewellyn, Joseph C., 38 S. Dearborn St.
 Llewellyn, Ralph C., 38 S. Dearborn St.
 Lloyd, Albert L., 180 N. Michigan Ave.
 Loeb, Irving Jerrold, 612 N. Michigan Ave.
 Loewenberg, Israel S., 111 W. Monroe St.
 Long, Frank B., R. 900-333 N. Michigan
 Lonek, Adolph, 3949 W. 26th St.
 Lorenc, Joseph A., 6276 Niagara Ave.
 Lovdall, Geo. F., 25 N. Dearborn St.
 Love, Robert J., 104 S. Michigan Ave
 Lovell, McDonald, 224 E. Ontario St.
 Lovell, Sidney, 224 E. Ontario St.
 Ludgin, Joseph G., 310 S. Michigan Ave.
 Luebker, Otto, 643 Wellington Ave.
 Lund, Anders G., 453 W. 63rd St.
 Lurvey, Louis, 8 Ogden Ave.
 MacBride, E. Everett, 5632 Blackstone Ave.
 MacDonald, Alexander, 324 W. 108th Pl.
 Mahaffey, David, 127 N. Dearborn St.
 Maher, Philip Brooks, 157 E. Erie St.
 Mallinger, John, 3323 N. Clark St.
 Malter, Jerome Mitchell, 185 N. Wabash Ave.
 Manasee, De Witt J., 3023 Blaine Place.
 Mann, William D., 32 W. Randolph St.
 Manning, Edgar J., 735 Bittersweet Place.
 Marks, Edward, R. 1110-64 W. Randolph St.
 Marley, James J., 330 S. Wells St.
 Martin, Albert R., Jr., 664 N. Michigan Ave.
 Martin, Edgar D., 180 N. Michigan Ave.
 Martini, Elisabeth A., 64 W. Randolph St.
 Marx, Elmer W., Room 1602—155 N. Clark
 Matteson, Victor Andree, 8 S. Dearborn St.
 Mayer, Carl H., 1515-104 S. Michigan Ave.
 Mayo, Ernest A., 53 W. Jackson Blvd.
 Mayo, Peter B., 53 W. Jackson Blvd.
 Mayo, Vivian B., 53 W. Jackson Blvd.
 McCarthy, Charles A., 6649 Minerva Ave.
 McCarthy, Jos. W., 139 N. Clark St.
 McCaughey, William F., Jr., 222 W. Adams
 St.
 McCauley, Willis Joseph, 2450 E. 78th St.
 McClellan, Edward G., 7441 Cottage Grove
 McCurry, Paul D., 234 W. 60th Place.
 McDonald, Luther Wilson, 7921 Constance
 McDougall, Walter A., 350 N. Clark St.
 McGavick, Joseph P., 4505 Lake Park Ave.
 McGrath, Paul J., 38 S. Dearborn St.
 McLaren, Robert J., 5934 Midway Park.
 McLaughlin, Daniel F., 1201 S. Michigan
 McMurry, Oscar L., 10629 S. Hale Ave.
 McNamara, Louis G., 180 N. Michigan Ave.
 McWhorter, Jerome C., 7712 Cregier Ave.
 Meder, Everett S., 20th Fl., 188 W. Randolph
 St.

New Ideal Red Line Basement Window



Overhead Ventilation
Outside Drainage
Sash—Easily Removable
Sash—Interchangeable

Glazing Clips Attached
Self-Locking Latch
Red Line Masonry Guide
Glazed with or without Putty

MADE IN FOUR STANDARD SIZES

IDEAL *Red Line* Steel Products

Manufactured and Distributed by

Ideal Steel Products

308 North Michigan Avenue

Chicago, Illinois

DEArborn 9257

Meldahl, Jens J., 559 Surf St.
 Meles, Edmund J., 105 W. Monroe St.
 Meredith, Davis D., 222 W. Adams St.
 Merrill, Edward A., 333 N. Michigan Ave.
 Merrill, John O., 333 N. Michigan Ave.
 Metz, Carl A., 307 N. Michigan Ave.
 Meyer, Frederic H., 820 Tower Court.
 Michaelsen, Christian S., 3256 Franklin Blvd.
 Miller, H. Clyde, 300 W. Adams St.
 Miller, John W., 4438 Greenwood Ave.
 Miller, Joseph A., 6440 Bosworth Ave.
 Miller, Wm. C., 4114 W. End Ave.
 Mills, Albert B., 3853 N. Keeler Ave.
 Milman, Ralph E., 104 S. Michigan Ave.
 Minchen, Sidney H., 139 N. Clark St.
 Minkus, Robert L., 208 W. Washington St.
 Mitchell, Joseph O., 228 N. La Salle St.
 Mitchell, Lewis M., 127 N. Dearborn St.
 Mohr, Frederick J., 123 W. Madison St.
 Monberg, Otto, 6045 Patterson Ave.
 Morehouse, Merritt J., 343 S. Dearborn St.
 Morey, Arthur G., 179 W. Washington St.
 Morgan, Charles L., 333 N. Michigan Ave.
 Morphett, Archibald S., 104 S. Michigan
 Morrow, Wm. A., 25 E. Delaware Pl.
 Morrison, James R. M., 134 N. La Salle St.
 Morse, Harry Leon, 155 N. Clark St.
 Mozier, Harry P., Room 902--189 W. Madison St.
 Mrazek, Joseph M., 1239 S. Tripp Ave.
 Mueller, Carl Oscar, 1625 Jarvis Ave.
 Mueller, Herbert E., 1501 Chase Ave.
 Mundie, Wm. Bryce, 39 S. La Salle St.
 Murison, Richard V., 343 S. Dearborn St.
 Nadherny, Joseph J., 38 S. Dearborn St.
 Nathan, Myer O., 123 W. Madison St.
 Nedved, Mrs. Elizabeth K., 814 Tower Court
 Nedved, Rudolph J., 814 Tower Court.
 Neebe, John, 3713 N. Kedvale Ave.
 Neil, Sidney S., 4311 N. Ashland Ave.
 Nelson, Edward O., 25 N. Dearborn St.
 Nelson, Edgar H., 3324 N. Harding Ave.
 Nelson, Joseph A., 2432 Irving Park Blvd.
 Nelson, Melvin A., 4633 N. Hermitage Ave.
 Nettenstrom, Joel U., 2425 Canton Ave.
 Newbold, Roy E., 157 E. Erie St.
 Newman, Edgar M., 107 N. Clark St.
 Nicholson, Wm. A., 6437 Harvard Ave.
 Nicol, Charles W., 310 S. Michigan Ave.
 Nielsen, Carl, 1513 N. Crawford Ave.
 Nielsen, Elker Roschill, 3059 Augusta St.
 Niemi, Arthur R., 879 N. State St.
 Nimmons, George C., 333 N. Michigan Ave.
 Nitsche, Edward A., 28 E. Huron St.
 Noonan, Thomas C., 1227 Columbia Ave.
 Nordeen, Harvey A., 5633 N. Bernard St.
 Norling, Engelbert C., 3714 Irving Park Ave.
 Norman, A. E., 6353 N. Clark St.
 Novy, Jos. J., 2434 S. Ridgeway Ave.
 Nyden, John A., 190 N. State St.
 O'Connor, Wm. J., 435 N. Michigan Ave.
 Odgers, Philip G., 5835 Nina Ave.
 Ohrenstein, Ernest J., 222 E. Ontario St.
 Oldefest, Edw. G., 605 N. Michigan Ave.
 Olesky, Walter J., 1959 N. Le Claire Ave.
 Oliver, Ralph H., 115 S. Dearborn St.
 Olsen, Leif E., 228 N. La Salle St.
 Olsen, Paul Frederick, 720 Cass St.
 Olson, Benj. Franklin, 19 S. La Salle St.
 Olson, Raymond L., 4038 N. Harding Ave.
 Oman, Samuel S., 431 N. Michigan Ave.
 Ording, Carl Henry, 1939 Chase Ave.
 Orrell, Jay C., 7800 Colfax Ave.
 Ostergren, Robert C., 155 N. Clark St.
 Otis, Samuel Shockford, 801 Cass St.
 Pagels, Wm. F., 6321 N. Talman Ave.
 Park, John W., 1219 Jarvis Ave.
 Parsons, Wm. Edward, 80 E. Jackson Blvd.
 Pashley, Alfred F., 431 S. Dearborn St.
 Patelski, Erich J., 179 N. Wells St.
 Pearson, Gustav E., 4000 West North Ave.
 Pearson, Warner M., 1525 E. 60th St.
 Peddle, Juliet Alice, 1300 N. Dearborn St.
 Peden, Robert E., 120 S. La Salle St.
 Peek, Carlyle, 2527 Lawrence Ave.
 Perkins, Dwight Heald, 160 N. La Salle St.
 Perkins, Ruth H. Miss, 1618 Fargo Ave.
 Perry, Ronald F., 9701 Vanderpool Ave.
 Peterson, Ivan Robert, 2527 Lawrence Ave.
 Pfahl, Louis Henry, 725 W. Erie St.
 Pierce, Richard Gordon, 222 W. Adams St.
 Pingrey, Roy E., 134 S. La Salle St.
 Pistorius, Bernard H., 1506 Rosemont Ave.
 Pond, Irving K., 180 N. Michigan Ave.
 Powers, Richard, 6 N. Michigan Ave.
 Prather, Fred V., 400 N. Michigan Ave.
 Prendergast, Richard W., 8058 Drexel Ave.
 Presto, Wm. C., 308 N. Michigan Ave.
 Pridmore, John E. O., 38 S. Dearborn St.
 Prindeville, Chas. H., 58 E. Washington St.
 Probst, Edward, 80 E. Jackson Blvd.
 Probst, Edward Eugene, 1417--80 E. Jackson Blvd.
 Probst, Marvin G., 1417--80 E. Jackson Blvd.
 Proskauer, Adolph, 159 N. State St.
 Puckey, Francis W., 400 N. Michigan Ave.
 Quinn, Everett F., 360 N. Michigan Ave.
 Quinn, James Edwin, 10 S. La Salle St.
 Quitsow, Anthony H., 228 N. La Salle St.
 Rabig, Charles E., Klari, 6344 Kenwood
 Raeder, Henry, 20 W. Jackson Blvd.
 Rapp, Geo. L., 190 N. State St.
 Rappaport, Benjamin J., 6151 Winthrop
 Ratcliffe, H. E., 123 W. Madison St.
 Rawson, Chas. P., 4416 Hazel Ave.
 Raymond, Emerson E., 1809 Patterson Ave.
 Rebori, A. N., 332 S. Michigan Ave.
 Redderson, Edward H., 4312 N. Ashland
 Reed, Earl Howell, Jr., 431 N. Michigan
 Reichert, Wm., 5528 Cornell Ave.
 Reily, S. L., 300 W. Adams St.
 Reiner, Eugene B., 1840 Eddy St.
 Reinholdt, Martin T., R. 1705, 122 S. Michigan Ave.
 Renwick, Edward A., 333 N. Michigan Ave.
 Repp, George W., 11844 S. Western Ave.
 Reynolds, Harold F., 1339 Glenlake Ave.
 Rezny, Adrian, 2202 S. Crawford Ave.
 Rezny, James B., 2202 S. Crawford Ave.
 Rice, Josiah L., 2440 Estes Ave.
 Richards, H. H., 5467 Washington Blvd.
 Riddle, Herbert H., 75 E. Wacker Drive.
 Riddle, Lewis W., 105 S. La Salle St.
 Riley, Ivan H., 3401 South Parkway.

"Always The Best"

ROOFING

Asbestos and Asphalt Built-up, Composition and Gravel, Asbestos Shingles....Rigid, Asphalt Shingles, Slate and Tile, Insulated, Truscon Steel Deck.

WATERPROOFING

Buildings, Viaducts, Bridges, Spray Decks.

ASPHALT MASTIC FLOORING

Industrial, Trucking Aisles, Acid Resisting.

DECORATIVE FLOORING

In attractive color combinations.

INSULATION

Boiler, Hot and Cold Water, Brine.

Using nationally known
Johns-Manville
Asbestos Products

ASBESTOS ROOFING & INSULATION CO.
CONTRACTING ENGINEERS

Terminal Building
Telephone Aurora 2-0470
Aurora, Illinois

1224 East Lincoln Highway
Telephone DeKalb 167
DeKalb, Illinois

Rinn, Charles, 4446 N. Rockwell St.
 Rippel, Fred O., 5535 W. Congress St.
 Rissman, Maurice B., 228 N. La Salle St.
 Ritter, Louis E., 140 S. Dearborn St.
 Roberts, Eben E., 82 W. Washington St.
 Roberts, Elmer C., 82 W. Washington St.
 Robertson, D., 8 S. Dearborn St.
 Robinson, Argyle E., 176 W. Adams St.
 Robinson, Harry F., 111 W. Washington St.
 Roeddiger, F. W. C., 8216 Luella Ave.
 Rognstad, Sigurd A., 3256 Franklin Blvd.
 Rohm, Jean Baptist, 160 N. La Salle St.
 Rohm, Wm., 160 N. La Salle St.
 Roller, Herman D., 343 S. Dearborn St.
 Roos, Bernard L., 3406 N. Cicero Ave.
 Root, John Wellborn, 333 N. Michigan Ave.
 Roth, Edgar, 7550 Saginaw Ave.
 Rouleau, Arthur, 3929 W. Van Buren St.
 Rowe, Charles Barr, 205 W. Wacker Drive.
 Rowe, Lindley P., 205 W. Wacker Drive.
 Roy, Franz, 9046 Commercial Ave.
 Rupert, Edward P., 6951 South Green St.
 Rupinski, Edward W., 2130 N. Kedzie Ave.
 Russell, Lewis E., 140 S. Dearborn St.
 Rusy, Anthony F., 1339 S. Avers Ave.
 Ruttenberg, Albert, 64 W. Randolph St.
 Ryan, Edmund J., 809 Sheridan Road.
 Ryan, William J., 180 N. Michigan Ave.
 Sailor, Homer G., 733 W. 64th St.
 Sandel, Monroe R., 10 E. Huron St.
 Sanders, Lewis Miles, 30 N. Dearborn St.
 Saxe, Albert Moore, 212 E. Superior St.
 Saxe, Ira C., 347 Belden Ave.
 Schaffner, Daniel J., 64 W. Randolph St.
 Schaub, Louis J., 1200 N. Ashland Ave.
 Scheller, Jesse E., 7606 Crandon Ave.
 Schenck, Rudolph, 122 S. Michigan Ave.
 Schiewe, Edward A., 5458 N. Sawyer Ave.
 Schlacks, Henry John, 820 Tower Court.
 Schlossman, Norman J., 612 N. Michigan
 Schmalz, Emil C., 5041 W. Madison St.
 Schmid, Richard G., 180 N. Michigan Ave.
 Schmidt, Hugo, 1165 N. Clark St.
 Schmidt, Richard Ernest, 104 S. Michigan.
 Schnakenberg, Henry, 3510 N. Oakley Ave.
 Schock, Frederick R., 5804 Midway Park.
 Schoening, Edward M., 9222 Houston Ave.
 Schoening, John A., 7335 South Park Ave.
 Schonne, Chas. W., 2543 Cullom Ave.
 Schultz, Martin M., 1955 W. Cullerton St.
 Schulze, Carl Elliott, 1511 W. Jackson Blvd.
 Schwartz, Albert A., 180 W. Washington St.
 Schwarz, Julius J., 64 W. Randolph St.
 Seator, Sinclair M., 19 S. La Salle St.
 Seipp, Edwin A., 105 S. La Salle St.
 Senescall, Lionel C., 7910 Essex Ave.
 Serpico, Frank J., 5305 N. Sawyer Ave.
 Sexton, Frank A., 435 N. Michigan Ave.
 Sevic, William, 1900 Blue Island Ave.
 Seyfarth, Robert E., 435 N. Michigan Ave.
 Shannon, James S., 364 N. Harding Ave.
 Shantz, Cedric A., 7330 S. Michigan Ave.
 Shattuck, Walter F., 134 N. La Salle St.
 Shaw, Alfred, 201 E. Delaware Ave.
 Sheldon, Karl H., Wrigley Bldg.
 Sherrick, John C., 8040 Evans Ave.
 Shpargo, Carl X., 11 S. La Salle St.

Sieja, Edward M., 111 W. Washington St.
 Sillani, Muzio, 2511 N. Clark St.
 Sir, Arthur J., 2737 Ainslie St.
 Sladek, Victor R., 546 Cornelia Ave.
 Sloan, Fred E., 161 E. Erie St.
 Slovynec, John, 5138 S. Artesian Ave.
 Slupkowski, Joseph A., 1263 N. Paulina St.
 Small, John S., 105 W. Adams St.
 Smith, David Henry, 5648 S. Morgan St.
 Smith, George H., 1637 Prairie Ave.
 Smith, George S., 8332 Luella Ave.
 Smith, Robert S., 111 W. Monroe St.
 Smith, Wm. Jones, 720 N. Michigan Ave.
 Smith, Z. Erol, 6750 Stony Island Ave.
 Sobel, Herbert, 30 N. Dearborn St.
 Soderberg, Andrew F., 7211 Harvard Ave.
 Sosna, Ned I., 185 N. Wabash Ave.
 Spencer, Charles B., 180 N. Michigan Ave.
 Spencer, Nelson S., 180 N. Michigan Ave.
 Spitz, Alexander H., 220 S. State St.
 Spitzer, Herbert I., 205 W. Wacker Drive.
 Spitzer, Maurice, 205 W. Wacker Drive.
 Spitznagel, Harold T., 6928 Oglesby Ave.
 Spohr, George S., 1538 Greenfield Ave.
 Sponholz, William C., 2249 Powell Ave.
 St. Clair, Charles T., 7548 Saginaw St.
 Stanhope, Leon, 55 E. Washington St.
 Stanton, Frederick C. H., 307 N. Michigan.
 Stebbings, Walter L., 53 W. Jackson Blvd.
 Steif, Benjamin Leo, 307 N. Michigan Ave.
 Steigeley, Arthur C., 2546 E. 73rd St.
 Steinbach, John G., 155 N. Clark St.
 Steinberg, Edward, 360 N. Michigan Ave.
 Steinborn, Edward, 123 W. Madison St.
 Stephens, Burett H., Room 816—192 N. Clark St.
 Stern, Isaac S., 185 N. Wabash Ave.
 Stockton, Walter J., 307 N. Michigan Ave.
 Stoddard, Herbert H., 77 W. Washington St.
 Stoetzel, Ralph E., 612 N. Michigan Ave.
 Stott, Roy Walter, 1558 W. 79th St.
 Strandel, Charles A., 3959 Lincoln Ave.
 Strauch, Moriz F., 800 W. North Ave.
 Streeter, Sereno Edward, 2408 E. 74th St.
 Strelka, Leo, 844 Rush St.
 Sturges, Howard P., R. 727, 105 N. Clark St.
 Sturnfield, Chas. H., 600 Blue Island Ave.
 Sumarkoff, Leonard P., 5135 Glenwood Ave.
 Suter, Walter Lindsay, 1220 E. 54th St.
 Svoboda, Albert F., 155 N. Clark St.
 Swanson, Robert C., 5404 N. Christiana Ave.
 Swarz, August, 1325 E. 52nd St.
 Swensson, Walter F., 448 Grant Place.
 Swern, Perry W., 228 N. La Salle St.
 Taggart, John A., 5607 W. Lake St.
 Tallmadge, Thos. E., 160 N. La Salle St.
 Teich, Frederick J., 64 W. Randolph St.
 Teisen, Axel V., 4804 N. Kedzie Ave.
 Tesch, George D., 3006 Eastwood Ave.
 Deutsch, Carl M., 2555 Winnemac Ave.
 Thielbar, Frederick J., 219 E. Superior St.
 Thomas, Theodore G., 839, 72 W. Adams St.
 Thomsen, Frederick W., 1945 Seminary
 Thorud, Bert M., 160 N. La Salle St.
 Tilton, John Neal, Jr., 127 N. Dearborn St.
 Tocha, Anton A., 1064 Milwaukee Ave.
 Trowbridge, Raymond W., 20 E. Huron St.



Medinah Athletic Club

Walter W. Ahlschlager, Architect

Sager Metal Weatherstrips

Installed Complete by

SAGER METAL WEATHERSTRIP CO.

GEO. F. WOLFF, Pres.

Factory and General Offices:

2531-33 Homer St., Chicago, Ill.

Phone Armitage 1130

Tucker, George E. L., Jr., 1107 W. Van Buren St.

Turbyfill, David W. T., 123 W. Madison St.

Turner, John W., 4431 N. California Ave.

Twery, Lewis E., R. 1100, 185 N. Wabash Ave.

Uffendell, W. Gibbons, 39 S. State St.

Urbain, Jules, Jr., 228 N. La Salle St.

Urbain, Leon F., 1254 Lake Shore Drive.

Urbanek, Chas. A., 1423 S. Avers Ave.

Vade, Louis Henri, 58 W. Washington St.

Valerio, Francis M., c/o F. O. De Money, 30 N. La Salle St.

Van Gunten, Orlando, 26 E. Huron St.

Van Gunten, Tillman J., 26 E. Huron St.

Varney, Ralph W., 220 S. Michigan Ave.

Vesely, William J., 155 N. Clark St.

Vibelius, Fred N., 909 Argyle Ave.

Viehe-Naess, Ivar, 180 N. Michigan Ave.

Viker, Guttorm A., 1415 Greenleaf Ave.

Vitzhum, Karl M., 307 N. Michigan Ave.

Voita, Eugene, 837 N. Lorel Ave.

Von Holst, Herman V., 79 W. Monroe St.

Waful, Edward E., 140 S. Dearborn St.

Walcott, Chester H., 435 N. Michigan Ave.

Walcott, Russell S., 75 E. Wacker Drive.

Walker, Frank Chase, 1065 Balmoral Ave.

Wall, Richard J., 2330 N. Halsted St.

Wallace, Dwight G., 22 W. Monroe St.

Wallace, Maurice R., 924 E. 63rd St.

Walter, George S., 510 N. Dearborn St.

Waterman, Harry Hale, 3915 Vincennes

Watson, Vernon S., 160 N. La Salle St.

Weber, Alfred P., 155 N. Clark St.

Weber, Arthur M., 343 S. Dearborn St.

Weber, Bertram, 343 S. Dearborn St.

Webster, Maurice H., 225 N. Michigan Ave.

Weich, Peter John, 2651 Winona Ave.

Weisfeld, Leo H., 155 N. Clark St.

Weiss, John W., 53 W. Jackson Blvd.

Wells, Willis L., 936 Lake Shore Dr.

Wenisch, Walter F., 737 N. Michigan Ave.

Westerlind, Carl W., 917 Galt Ave.

Wheeler, Chas. F., 3703 Irving Park Blvd.

Wheelock, Harry B., 64 W. Randolph St.

White, Chas. E., Jr., 343 S. Dearborn St.

White, Howard J., 1417-80 E. Jackson Blvd.

Whitney, Wm. P., 228 N. La Salle St.

Wiener, Jerome L., 5341 Woodlawn Ave.

Wiener, Lewis E., R. 225, 308 N. Michigan Ave.

Williamson, Robert B., 1649 Arcade Place.

Wilmanns, August C., 35 S. Dearborn St.

Winiarski, Maryan F., 1859 W. Chicago

Woerner, Adolph, Jr., 3166 Lincoln Ave.

Wolff, Richard G., 4100 S. Albany Ave.

Woltersdorf, Arthur F., 360 N. Michigan

Work, Robert G., 75 E. Wacker Drive.

Works, William, 8129 Evans Ave.

Worthmann, Henry, 155 N. Clark St.

Wright, Clark C., 333 N. Michigan Ave.

Wright, Wm. Campbell, 720 N. Michigan

Yerkes, Wallace F., 820 Tower Court.

Young, Gilman B., 6723 Normal Blvd.

Zaldokas, Mathew E., 1908 W. Division St.

Zakharoff, Alexis, 431 S. Dearborn St.

Zimmer, John E., 4 W. Ontario St.

Zimmerman, Hugo H., 1711 Fullerton Ave.

Zimmerman, Ralph W., 212 E. Superior St.

Zimmerman, W. Carby, 212 E. Superior St.

Zook, R. Harold, 140 S. Dearborn St.

Zucco, Angelo, 4438 N. Ashland Ave.

Zuckerman, Benj. S., 53 W. Jackson Blvd.

CHICAGO SUBURBS

BERWYN

Vedra, Charles, 6805 W. 22nd St.

BLUE ISLAND

Van Gilder, Arthur, 388—119th Place.

CICERO

Filas, Thomas M., 5322 W. 25th St.

Vittner, Clement, 2531 S. 61st Court.

Zelenka, Anthony J., 6001 W. 22nd St.

CHICAGO HEIGHTS

Thoresen, Thorgils, 40 Unity Bldg.

CONGRESS PARK

Bush, Earl, 520 Du Bois Blvd.

DES PLAINES

Winsauer, Louis M., Hawthorne Lane.

DOWNERS GROVE

Kennison, Herbert A., 848 Chicago Ave.

ELMHURST

Canfield, Herbert H., 243 Clinton St.

Downton, Herbert E., 118 Pine St.

Knudson, Johann F., 129 Clinton Ave.

EVANSTON

Anderson, Edwin F., 2735 Hartzell Ave.

Arneson, Stephen V., 1618 Orrington Ave.

Andrews, Alfred B., 847 Forest Ave.

Ayars, Charles R., 1518 Sherman Ave.

Beck, Beresford E., 849 Ridge Ave.

Beersman, Charles G., 1044 Judson Ave.

Blake, Edgar O., 634 Davis St.

Danielson, Philip A., 1569 Sherman Ave.

Gratia, Simeon D., 2744 Asbury Ave.

Kincaid, James L., 1810 Sherman Ave.

Markel, Charles H., 2206 Bennett Ave.

Maher, Harry E., 1564 Sherman Ave.

McGrew, Kenneth A., 1564 Sherman Ave.

Mittelbush, Edwin H., 1319 Oak Ave.

Ross, Henry J., 1508 Oak St.

Salisbury, Ralph D., 2727 Thayer St.

Sanford, Trent E., 850 Hinman Ave.

Schmidt, Frederic B., 939 Maple Ave.

Sorgatz, Wm. D., 1915 Sherman Ave.

Speer, Geo. A., 636 Church St.

Spicer, Ralph F., 720 Hinman Ave.

Sturm, Meyer J., 708 Church St.

Whitman, Mrs. Bertha, 2656 Lincolnwood Drive.

FOREST PARK

Kastrup, Carl Joseph, 637 Elgin Ave.

GLEN ELLYN

Christie, Louis R., 379 Hill Ave.

Hoskins, Henry J. B., 293 Park Blvd.

Walker, Fred G., 466 Main St.



Architects, Holabird & Roche Stevens Hotel, Chicago, Ill. Geo. A. Fuller Co., Contractors

20 MILES OF CHAMBERLIN WEATHER STRIP

FOR 36 years Chamberlin has operated on the principle that weather stripping, to be permanently efficient, demands more than correctly designed, carefully made weather strips. The Chamberlin principle includes exacting attention to installation. Therefore, Chamberlin exclusively installs its weather strips. All work is done by Chamberlin mechanics trained and su-

pervised to work to the Chamberlin standard. And, as final assurance of enduring satisfaction, Chamberlin guarantees and services its equipment for the life of the building. Small wonder that Chamberlin Weather Strips—economical but the best you can buy—are found on so many residential and outstanding buildings—such as the Stevens, the world's largest hotel.

CHAMBERLIN METAL WEATHER STRIP CO., Inc.
DETROIT, MICHIGAN

100 Sales and Service Branches throughout the United States
CHICAGO DISTRICT OFFICE

Phone Harrison 454

R. M. BURNS, Dist. Mgr.

704-06 South Dearborn Street

CHAMPAIGN

PEORIA

ROCKFORD



GLENCOE

McEldowney, Harold B., 612 Washington
Scribbins, John A., 600 Vernon Ave.

GLENVIEW

Maynard, Henry S., Jr., 26 Park Drive.

HIGHLAND PARK

Hoermann, Carl, 835 Forest Ave.
Van Bergen, John S., 234 Cedar St.
Vigeant, Xavier, 5 N. Sheridan Rd.

HINSDALE

Burt, Paul Gordon, 187 S. Elm St.
Field, Harford, 212 6th St.

HOMEWOOD

Pipher, Wesley V., 18453 Martin Ave.

ITASCA

Swanson, Carl E.

LA GRANGE

Caldwell, Will Carleton, 404 S. Catherine
Tilton, John N., Jr., 123 S. Kensington Ave.
Trow, Robert Cotton, 48 S. Ashland Ave.
Wilkins, Samuel Willis, 14 S. 5th Ave.

LAKE FOREST

Jones, F. W., 725 N. Oakwood Ave.
Ticknor, James H., 262 Deerpath Rd.

MAYWOOD

Koenig, Fred, 143 S. 9th Ave.

MELROSE PARK

Chiaro, John A., 9 Broadway Ave.

OAK PARK

Ansel, Anton, 1115 Wisconsin Ave.
Barnes, Allen L., 1007 N. Taylor Ave.
Bowes, Frederick W., 729 N. Ashland
Brunkow, Otto E., 1107 Holly Ave.
Carstens, Milton S., 436 S. Euclid Ave.
Clare, Wm. H., 633 S. Oak Park Ave.
Duca, Paul N., 608 N. Austin Blvd.
Ellis, Francis M., 231 S. Oak Park Ave.
Fiddelke, Henry G., 1025 Superior St.
Hotchkiss, Roy James, 115 N. Oak Park
Howe, Stanley W., 1126 Randolph St.
Hulla, John, 225 Clinton Ave.
Johnson, Stanley W., 847 Howe Ave.
Kaltenbrun, James A., 215 S. Lombard Ave.
Kristen, Charles Andre, 701 N. Lombard
La Belle, Edw. C., 410 Wisconsin Ave.
Maiwurm, Arthur B., 1100 North Blvd.
Maiwurm, Rudolph G., 1047 Pleasant St.
Manard, Robert P., 220 Iowa St.
Peterson, J. Edwin, 204 S. Humphrey Ave.
Poulsen, George F., 643 N. Elmwood Ave.
Pray, Frank M., 426 Parkside Ave.
Roncoli, Louis P., 30 Le Moyne Parkway.
Siljander, Albert A., 151 N. Taylor Ave.
Ullrich, Clarence A., 904 N. Hayes Ave.
Washburn, Fred R., 1012 Chicago Ave.

ORLAND

Pomeroy, Jim T.

PARK RIDGE

Pope, Charles F., Jr., 621 Courtland Ave

RAVINIA

Bentley, Harry H., 337 Woodland Blvd.

RIVER FOREST

Christensen, John C., 822 Franklin Ave.
Drummond, William E., 547 Edgewood Pl.
Littrell, Donald B., 231 Park Row.

RIVERSIDE

Baldwin, Francis M., 46 N. Harlem Ave.
Barnum, George Loyd, 275 Lionel Ave.
Brabant, Gifford, 113 Lincoln Ave.
Dittrich, Francis Joseph, 344 Selbourne Rd.
Dvorak, Joseph, 406 Repton Rd.
Keeber, C. Hamilton, 148 Maplewood Rd.
Krieg, Arthur W., 114 Lincoln Ave.
Smithson, Albert T., 298 Lionel Rd.
Wills, Arthur Douglass, 224 Herrick Rd.
Wills, Arthur J., 224 Herrick Rd.

WESTERN SPRINGS

Heimbrott, Carl Edward, 4110 Lawn Ave

WHEATON

Salisbury, Robert H., Liberty Drive.

WILMETTE

Bourgeois, Louis J., 536 Sheridan Rd.
Hyett, Robert Leal, 511 Maple Ave.
Kegley, Frank T., 910 Oakton St.
Marshall, Benjamin H., 612 Sheridan Rd.
Naper, Herbert J., 1127 Lake Ave.
Peterson, Stanley M., 231 17th St.
Rae, Robert, Jr., 431 Greenleaf Ave.
Reinhardt, G. A., 1431 Lake Ave.
Sholes, E. Roy, 1507 Highland Ave.
Thompson, Magnus, 1144 Lake Ave.
Walton, Lewis B., 848 Ash St.

WINNETKA

Baker, Cecil F., 558 Willow Road.
Benkert, Ernest A., 887 Ash St.
Windes, Frank A., 598 Birch Ave.

CITIES OUTSIDE OF CHICAGO AND COOK COUNTY

ALTON (Madison Co.)

Maupin, James M., 518 Commercial Bldg.
Pfeiffenberger, Geo. D., 102 W. Third St.
Stelle, Oliver G., 3112 Leverett Ave.

ANTIOCH

Jyrch, Karl, Petite Park.

AURORA (Kane Co.)

Gray, Frank B., 67 S. La Salle St.
Malmer, Eugene, 233 W. Park Ave.
Spierler, Herbert E., Graham Bldg.

BARRINGTON

Maxon, Norman T., 125 E. Hillside Ave.



Federal equipment is a standard product—easily installed—and rendering a maximum of service.

No complicated assembly in its construction to cause expense for maintenance.

Wherever supplied, it remains a continued credit to the architect who specified its installation.

We will be pleased to give you the benefit of our thirty years experience for the solution of any situation presenting unusual difficulties.

Federal Metal Weather Strip Co.

4538 - 4558 Fullerton Avenue

Chicago, Illinois

Phone: Spaulding 4660

BATAVIA

Elwood, Franklin G., 173 Illinois Ave.

BLOOMINGTON (McLean Co.)

Lundeen, Edgar E., People's Bank Bldg.
Moratz, Arthur M., 701 People's Bank Bldg.
Schaeffer, Archie N., People's Bank Bldg.
Simmons, Aaron T., 310 N. Main St.

CARBONDALE

Thompson, Thomas S., 1000 Thompson St.

CARTHAGE (Hancock Co.)

Payne, Edgar A., 1025 Main St.

CHAMPAIGN (Champaign Co.)

Berger, Frederick E., 44 Main St.
Jarvis, John D., 25 John St.
Kelley, Ralph L., 44 Main St.
Kratz, Elvin V., 315 S. State St.
Lescher, Frank M., 1005 S. First St.
Ramey, George Edwin, Robeson Bldg.
Reeve, Keith G., 905 1st St.
Weidemeyer, William M., 905 W. Williams St.

COLLINSVILLE (Madison Co.)

Eberhardt, Henry W., 207 E. Main St.

CRYSTAL LAKE

Scoville, David B., 19 Elmhurst Ave.

DAVIS JUNCTION

Fraser, Willard E.

DANVILLE (Vermillion Co.)

Liese, Geo. C., Temple Bldg.
Ludwig, Geo. W., Temple Bldg.
McCoy, John F., Temple Bldg.
Skadden, Harvey F., Temple Bldg.
Strader, George M., 845 Greggs Ave.
Stuebe, L. F. W., Adams Bldg.

DECATUR (Macon Co.)

Aschauer, Chas. J., Citizens Bank Bldg.
Bramhall, Arthur E., 209 National Bank of Decatur.
Brooks, Barkley S., 209 Nat. Bank of Decatur.
Clausen, Swen A., Linkweller Bldg.
Dague, England D., 207 Natl. Bank Bldg.
Harris, Charles, Standard Life Bldg.
Miers, Clayton T., 1049 W. Macon St.
Waggoner, Arthur M., 224 Citizens Bank Bldg.

DE KALB

Marston, Louis H., 137½ E. Lincoln Highway.

EAST ST. LOUIS (St. Clair Co.)

Frankel, Albert B., 552 N. 13th St.
Goedde, Bernice R., 546 N. 10th St.
Mueller, Bernhard A., 209 Arcade Bldg.
Riester, Frank P., 531 Murphy Bldg.

EDWARDSVILLE (Madison Co.)

Kane, Michael B., Bohm Bldg.

ELGIN (Kane Co.)

Abell, Ralph E., 162 E. Chicago Ave.
Morris, George E., Sherwin Bldg.

GALESBURG (Knox Co.)

Aldrich, Harry G., Mail Bldg.
Aldrich, Norman K., Mail Bldg.
Beadle, John Grant, 234 E. Main St.

GRANITE CITY

Pauly, Charles, 19th & C Sts.
Pauly, Edward C., 19th and C Sts.

JACKSONVILLE (Morgan Co.)

Buckingham, Clarence W., Ayers Bank Bldg.
Piersón, James K. C., Ayers Bldg.

JOLIET (Will Co.)

Cowell, Herbert, 1 Jefferson St.
Coyle, John Edward, 315 E. Jefferson St.
Hoen, Rudolph G., Joliet Nat. Bank Bldg.
Jennings, John F. W., Joliet Natl. Bank Bldg.
Kruegel, Arnold J., Allen & Des Plaines
Tomlinson, Henry Webster, 106 N. Chicago
St.
Wallace, Chas. L., Will County Nat. Bank
Bldg.
Webster, Charles Woods, 400 Cutting Bldg

KANKAKEE (Kankakee Co.)

Henry, Charles D., 811 Volkman Bldg.

KEWANEE

Hay, Mark, 304 W. 2nd St.

LA SALLE

Thompson, Sherman, 861 O'Connor Ave.

LINCOLN (Logan Co.)

Deal, Joe Mindert.
Ginzle, Roland F., 125 Chestnut St.

MACOMB (McDonough Co.)

Holmes, Willis B.

METROPOLIS

Daly, Samuel Lester, 412 Girard St.

MOLINE (Rock Island Co.)

Eckerman, Oscar A., 640 19th St.
Lundeen, Curt, Peoples Bldg.
Paul, Clarence T., 1595 34th Ave.
Schulzke, Wm. H., Peoples Bank Bldg.

MORTON GROVE

Gilbert, Ernest E., 7941 N. Kedvale Ave.

MOUNT MORRIS

Buser, Nathaniel E., Buser Bldg.

MURPHYSBORO

Gill, Rudolph Z., 1328 Walnut St.

OTTAWA (La Salle Co.)

Hanifen, John, Nertney Bldg.
Richardson, Jason F., Jr., Century Life Bldg.

PEKIN

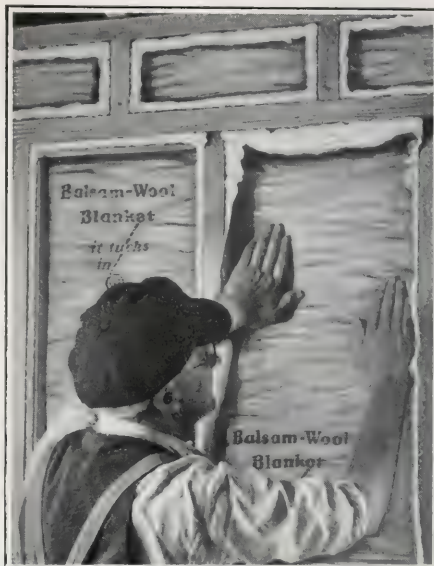
Richards, James V., 915 Park Ave.

Balsam-Wool Blanket

The Flexible Insulation Against Heat, Cold and Sound

Products: BALSAM-WOOL Standard Building Insulation for preventing heat losses through walls, roofs, floors and ceilings, and for the sound-deadening of floors and walls. BALSAM-WOOL Acoustical Blanket for the correction of acoustics in auditoriums and theatres. Especially suitable for theatres using talkies. Complete information on request.

BALSAM-WOOL Standard Building Insulation is a blanket form of heat and sound insulation. It is made of wood fibers in fleecy wool form permanently matted together between two sheets of asphalt-coated, tough, flexible, creped, Kraft paper. These paper liners render BALSAM-WOOL wind proof and water proof. BALSAM-WOOL is chemically treated to make it fire resistant. It will char when exposed to flame but will not smolder or burn after the flame is re-



Applying one-inch Balsam-Wool between studding

HOT PLATE METHOD

Material	Mean Temp.	Thermal Conductivity Per Inch Thick.	Authority
Balsam-Wool	70° F.	.246	Peebles Bureau of Standards
Balsam-Wool	90° F.	.27	

HOT BOX METHOD

Description	Mean Temp.	Heat Transmission Factor U	Authority
3/8" Wood Lath and 3/8" Plaster, 3/4" fir sheathing, building paper, 4" lap siding, insulation 1" C., flanged midway in air space between studding.	40.2° F.	.115	Rowley

* Taken from Journal of A. S. H. & V. E., Vol. 34, No. 7 (July, 1928), Page 536, Insulation "C" 1/2" Balsam Wool.

moved. BALSAM-WOOL contains no animal matter. It will not attract or harbor vermin. It is clean, odorless, and sanitary. A Weyerhaeuser product.

Thermal Conductivity: In BALSAM-WOOL the natural heat resistance of wood is multiplied many times by a re-arrangement of the wood fibers into a "wool" form which is 95% still air. Hot plate tests giving the conductivity of BALSAM-WOOL itself and the hot box test giving the heat transmission of a built-up frame wall insulated with BALSAM-WOOL are given in the accompanying table.

Sizes: BALSAM-WOOL Standard Building Insulation is made in two thicknesses, full inch and half inch, and in standard widths of 17", 25", and 33". It comes rolled, wrapped and sealed.

Sold Through Lumber Dealers: BALSAM-WOOL Standard Building Insulation is distributed through retail lumber dealers. Stocks are carried by dealers in all sections and any lumber dealer can promptly obtain a supply.

For further information and Detailed Specifications Address:

WOOD CONVERSION COMPANY

360 North Michigan Avenue

Telephone Franklin 5865

CHICAGO, ILLINOIS

GENERAL OFFICE AND FACTORY, CLOQUET, MINN.

PEORIA (Peoria Co.)

Baillie, John McLellan, 933 Hamilton Blvd.
 Davis, George H., 527 Moss Ave.
 Dox, Hamilton B., 502 Lehmann Bldg.
 Emerson, Frank N., 1600 Peoria Life Bldg.
 Gregg, Richard S., 1600 Peoria Life Bldg.
 Harrison, Elbert, 1014 Peoria Life Bldg.
 Hercules, Jacob W., 308 W. Sherman St.
 Hewitt, Herbert, 1600 Peoria Life Bldg.
 Hotchkiss, Robert J., 330 Central Life Bldg.
 Hulsebus, Bernhard S., Jefferson Bldg.
 Jameson, Walter G., 1014 Peoria Life Bldg.
 Kiefer, Albert, 314 Third Ave.
 King, John F., 801—4th Ave.
 Koch, Henry A., 722 Thrush Ave.
 Robinson, L. Eugene, Jefferson Bldg.
 Sedgwick, Wm. C., 404 Melbourne Ave.
 Smith, Paul, 1600 Peoria Life Bldg.
 Traeger, Chas. W., 107 Hurlburt St.
 Whitmeyer, Mark H., Cent. Nat. Bank Bldg.

PERU

Wachter, Henry F. A., 504 Grant St.

QUINCY (Adams Co.)

Behrensmeyer, George A., 615 W. C. U. Bldg.
 Geise, Martin J., 800½ Main St.
 Hafner, Wilbert E., W. C. U. Bldg.
 Jokiel, Joseph, 3rd and Delaware Sts.
 Wood, Ernest M., 126 N. 8th St.

ROCKFORD (Winnebago Co.)

Bardoga, Jesse A., Nat. Bank Bldg.
 Bradley, Charles W., 520 Brown Bldg.
 Bradley, Harold S., 520 Brown Bldg.
 Carpenter, Frank A., 226 S. Main St.
 Eklund, Herman, 121 7th St.
 Eliel, Arthur G., Stewart Bldg.
 Hubbard, Willis W., 816 Overlook Rd.
 Johnson, Gilbert A., 129 N. Gardner St.
 Orput, Raymond, Mfg. Nat. Bank Bldg.
 Peterson, Edward A., 2622 E. State St.
 Rubach, Otto W., Murphy Bldg.
 Titus, Armour, 624 N. First St.
 Vander Meer, Wybe J., 214 Mea. Bldg.
 Wolfley, Chester E. H., 909 Talcott Bldg.

ROCK ISLAND (Rock Island Co.)

Cervin, Olaf Z., Safety Bldg.
 Chapler, Elijah C., 1635 12th St.
 Horn, Benjamin A., Central Trust Bldg.
 Lerch, Edward, 2211 26th St.
 Sandberg, Rudolph C., 1568 41st St.
 Stromquist, Victor H., 735 8th Ave.
 Stuhr, Wm., 310 Safety Bldg.

RUSHVILLE

Thompson, James Arthur.

SANDWICH (De Kalb Co.)

Howison, Charles.

SHELBYVILLE

Chaffee, Dudley C.

SHELDON

Clark, Charles R.

SPRINGFIELD (Sangamon Co.)

Bullard, Clark W., 318 Unity Bldg.
 Bullard, Robert A., 318 Unity Bldg.
 Conway, Wm. H., 104 E. Side Square.
 Hanes, Murray S., 205½ S. 6th St.
 Hanes, Samuel J., 205½ S. 6th St.
 Helmle, George B., First Nat. Bank Bldg.
 Helmle, Henry R., First Nat. Bank Bldg.
 Lindstrom, William J., 856 S. English Ave.
 Macardell, Cornelius W., Div. of Architecture, State Capitol.
 Meyer, Carl T., 104 N. 6th St.
 Pleins, Leo H., Div. of Architecture, State Capitol.
 Reiger, Harry J., Booth Bldg.

STREATOR (La Salle Co.)

Allen, Alonzo W., 601 W. Bridge St.
 Stouffer, Ernest L., 332 Main St.

URBANA (Champaign Co.)

Ayers, Donald R., New Arch. Bldg.
 Danely, Paul, Flat Iron Bldg.
 Doak, John, 256 Administration Bldg.
 Maxwell, Wymer W., 512 W. Oregon St.
 Provine, L. H. Prof., 306 Engineering Bldg., U. of I.
 Royer, Joseph W., Flat Iron Bldg.
 White, James M., Administration Bldg.

WARRENVILLE

New, Mathew, Calumet Ave.

**ARCHITECTS OUTSIDE OF
THE STATE OF ILLINOIS****ALABAMA****BIRMINGHAM**

McCauley, Charles H., 700 Jackson Bldg.

ARIZONA**PHOENIX**

Green, Herbert H., 49 Country Club Drive.
 McArthur, Albert Chase, 311 W. Jefferson St.

CALIFORNIA**BEVERLY HILLS**

Foster, William G., 645 Coventry Road.

HOLLYWOOD

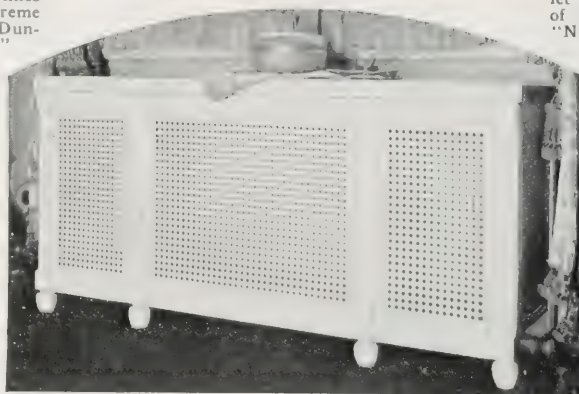
Clarke, Edwin B., 1257 N. Fairfax Ave.
 Eskridge, Fred A., 202—1st Nat. Bank Bldg.

LOS ANGELES

Beach, Wilfred W., 407 S. Hope St.
 Corbey, Leon J., 1529 W. 9th St.
 Crow, Ralph M., 237 N. Flower St.
 Hoover, Ira W., 408 S. Oxford Ave.
 Lee, Simeon Charles, 530 Petroleum Securities Bldg.
 Miller, Marcus P., 301 Board of Trade Bldg.
 Mueller, Floyd E., 544 S. New Hampshire Ave.
 Norton, Francis J., Box 1233.

A new model
along the lines
of that supreme
designer "Dun-
can Phyfe."

Write for book-
let descriptive
of new Model
"N" Enclosure.



TRICO for Radiator Concealment

Wherever there is a bare radiator—in the home, hotel, private office or show room—to be brought in harmony with the interior scheme—there is a Trico Radiator Enclosure or Cover of the exact style and finish required.

Trico Radiator Furniture is scientifically constructed to accomplish all that is claimed. It will transform ugly cast iron radiators into beautiful pieces of furniture, useful as window seats, consoles, shelves and tables; humidify the air making living conditions more liveable and healthful; stop smudge on walls and expensive furnishings; and increase value of property where installed.

Twelve years ago Trico originated Radiator Furniture and since has been the leader of the industry. In Chicago there is more than twice as much Trico Radiator Furniture installed as that of all competitive manufacturers combined. Some recent Trico installations include the Edgewater Beach Hotel, Blackstone Hotel, Congress Hotel, Northwestern University, The Great Atlantic and Pacific Tea Company and Western Union.

A national organization is maintained with offices in all principal cities to serve Architects and Builders.

Specifications and quotations will be gladly furnished on request.

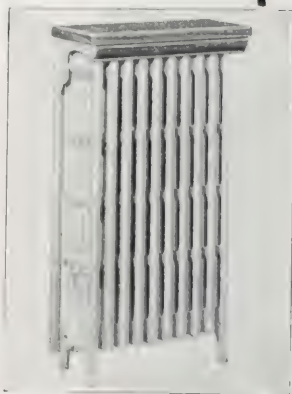
TRICO, Inc.

Subsidiary Art Metal Radiator Cover Co.

1734 No. Kolmar Ave.

Chicago, Illinois

Telephone Capitol 3390-1-2 or 3



Open Type Cover with
water pan concealed be-
neath top.

OJAI

Brandt, Berkley, The Hermitage.

OAKLAND

Ferree, Harold C., 378 Grand Ave.
Hanifen, Arthur C., 933—32nd St.

PASADENA

Gillette, Edwin F., 691 La Loma Rd.
Reuter, Herman A., R. R. 1, Box 50.

SACRAMENTO

Peterson, Jens C., 1002 California State
Life Bldg.

SAN DIEGO

Zippwald, Otto, Lemon Grove.

SAN FRANCISCO

Lansburgh, Gustav A., 140 Montgomery St.

SANTA ANA

Vrydagh, Jupiter G., 505 S. Birch St.

SANTA BARBARA

Ray, Russell, 1906 State St.

SANTA MONICA

Rinaker, John I., 444 25th St.

COLORADO

DENVER

Laughlin, John A., 1522 Court Place.
Simon, Walter H., 1526 Lincoln St.
Winkel, Benno J., 3985 W. 1st St.

DISTRICT OF COLUMBIA

WASHINGTON

Cross, Roy W., 4115 Wisconsin Ave.
Jullien, Phillip M., 917 15th St. N. W.
Wilkinson, Lawrence E., 16 Johnson Place.

FLORIDA

COCOANUT GROVE

Lang, Albert, 3608 W. Gaudems Rd.

MIAMI

Schimek, Alfred F., 712 Congress Bldg.

GEORGIA

ATLANTA

Constantine, Augustus E., 1061 Boulevard,
N. E.

INDIANA

CRAWFORDSVILLE

Beeson, Carroll O., 220 Ben Hur Bldg.

EDWARDSPORT

Reeve, Keith G.

EVANSVILLE

Berendes, Edwin C., 108 S. 4th St.
Boyle, Harry E., Furniture Bldg.
Fowler, Frank E., 1115 Chandler Bldg.

Legeman, Ralph Earl, 6th and Main Sts.
Olson, Carl M., 106 Harlem Ave.
Schlotter, Frank J., 113½ Upper 4th St.
Shoppell, Clifford, American Trust Bldg.

FORT WAYNE

Reidel, John M. E., Noll Blk.
Weatherhogg, Charles R., 250 W. Wayne

GARY

Cenek, Robert R., 739 Broadway.

HAMMOND

Barnard, Leslie Cosby, 830 1st Trust Bldg.
Berry, Addison C., Ruff Bldg.
Hutton, J. T., Hammond Bldg.

INDIANAPOLIS

Bohlen, August C., 1001 Majestic Bldg.
Bohlen, Oscar, 1001 Majestic Bldg.
Dietz, Henry Z., 609 Chamber of Commerce
Bldg.
Foltz, Herbert W., 129 E. Market St.
Hill, Norman H., 1050 N. Delaware St.
Honeywell, Albert A., 413 Penway Bldg.
Schreiber Geo. F., 801 Architects & Builders
Bldg.
Sturges, Lewis H., 527 Board of Trade Bldg.
Wright, George C., 1133 Hume Mansur
Bldg.

MARION

Lang, Frederick, Nat. Bank Bldg.

MARTINSVILLE

Branch, James E.

LEBANON

Pfeifer, Reuben John, 304 W. North Ave.

LOGANSPOUT (Cass Co.)

Horn, Carl J., 314½ Fourth St.

MICHIGAN CITY

Boonstra, Samuel P., 111 Georgia Ave.

MUNCIE

Houck, Charles H., 108 E. Washington St.

SOUTH BEND

Austin, Ennis R., 216 W. Washington St.
Ellwood, W. W., 209 N. Main St.

TERRE HAUTE (Vigo Co.)

Miller, Warren D., 222 Van Buren St.
Yeager, Ralph O., 215 Van Buren St.

VALPARAISO

Dorr, John I., 354 S. Greenwich Ave.

VINCENNES (Knox Co.)

Bayard, John B., Box 254.
Gaddis, John W., Am. Nat. Bank Bldg.
Routt, Lester W., 1012 Perry St.
Schucker, Rudolph W., 509 N. 8th St.
Sutton, Byron, Citizens Trust Bldg.

"IRONITE"

Registered United States Patent Office

PRESERVES—PROTECTS—RESTORES

CONCRETE

W
A
T
E
R
P
R
O
O
F
I
N
G

Deep Basements

Pits—Vaults

Tunnels—Dams

Swimming Pools

Water Reservoirs



Concrete Structures

Retaining Walls

Grain Elevators

Abutments

Bridges—Stadia

Sewage Disposal Plants

ALL WORK EXECUTED UNDER
CONTRACT AND GUARANTEE

F
U
M
E
P
R
O
O
F
I
N
G

RESTORATION

ENGINEERS

CONTRACTORS

**CENTRAL
IRONITE WATERPROOFING COMPANY
CHICAGO**

Franklin 7923

111 W. Washington St.

Sole Licensee This District

IOWA

CEDAR RAPIDS

Gauger, Raymond J., 1214—2nd Ave.
Moore, Raymond F., Merchants' Nat. Bank Bldg.

CLINTON

Ladehoff, John H., 1309 W. Pleasant St.
Legel, John G., Jr., 410 Howes Bldg.
Morrell, Albert H., 508 Weston Bldg.

DAVENPORT (Scott Co.)

Clausen, Rudolph J., 910 Kahl Bldg.
Ebeling, Arthur H., 719 Kahl Bldg.
Klein, Carrol A., 910 Kahl Bldg.
Muesse, Howard S., 2727 Jefferson Ave.
Temple, Seth Justin, 11 E. Third St.
Whitaker, Raymond C., 1202 Adams St.

DES MOINES

Rawson, Harry D., 810 Hubbell Bldg.
Souers, Clark, 810 Hubbell Bldg.
Thomas, Oren R., 810 Hubbell Bldg.
Woodburn, Chester C., 806 Valley Nat. Bank Bldg.

DUBUQUE

Heer, Fridolin, Jr., Bank & Ins. Bldg.

FORT MADISON

Carswell, Robin B.

MASON CITY

Waggoner, Karl M., Bagley Beck Bldg.

OTTUMWA

Kerns, George M., 211 E. 2nd St.

SIOUX CITY

Arnold, Ralph, 406 Grain Exchange Bldg.

KENTUCKY

LOUISVILLE

Davis, Brinton B., 508 Columbia Bldg.
Gore, William E., Box 429.
Rosen, Richard O., 10th and Cedar Sts.

LOUISIANA

MONROE

Land, Herbert Henry, 1204 St. John St.

NEW ORLEANS

Davis, Chas. G., 1204 Jackson Blvd.

SELLERS

Nachstein, Peter, Box 13.

MARYLAND

BALTIMORE

Long, Maurice A., 10 W. Chase St.

MASSACHUSETTS

AMHERST

Thomas, Stafford Fox, 4 N. Prospect St.

BOSTON

Cram, Ralph Adams, 248 Boylston St.
Le Clear, Gifford, 31 St. James Ave.
Robbins, Henry Chandler, 31 St. James St.

MICHIGAN

ANN ARBOR

Rousseau, Albert J., 2001 Vinewood Blvd.

BLOOMFIELD HILLS

Morse, Frederic J., Lone Pine Rd.

COLON

Schulze, William, 907 Elm St.

DETROIT

Bergman, John, 231 Windsor St.
Confer, Earl L., 1460 Freeland Ave.
Derrick, Robert Owens, Union Trust Bldg.
Gamber, Branson Van Lee, 350 Union Trust Bldg.
Holmes, Harold, Davis and Hineman Sts.
Jordon, Lewis H., Marquette Bldg.
Kahn, Albert, Marquette Bldg.
Lewis, LeRoy, Jr., 1000 Marquette Bldg.
Pollmar, F. Carl, 2539 Woodward Ave.
Popkin, J. L., 318 Insurance Exchange.
Vail, Morrison H., 9303 E. Jefferson Ave.
Von Mueller, Curt, 1210 Francis Palms Bldg.

ESCANABA

Arntzen, Gothard, 723 Ludington St.

FLINT

Byers, Edwin Wm., 607 Citizens Bank Bldg.

GRAND RAPIDS

Dykema, Claude D., 803 G. R. Trust Bldg.

LANSING

Holmes, Warren S., 112 E. Allagan St.

MUSKEGON

Valentine, Edwin E., 404 Union Bank Bldg.

NILES

Schumaker, August J., 1639 Broadway.

STURGIS

Lawrence, Edgar H., 107 N. Clay St.

WALLED LAKE

Dunlap, E. R., R. F. D. No. 2.

MINNESOTA

MINNEAPOLIS

Dunham, Arthur B., 512 Essex Bldg.

ROCHESTER

Crawford, Harold H.

ST. PAUL

Darrell, Geo. Chas., 692 Endicott Bldg.

REFRIGERATORS

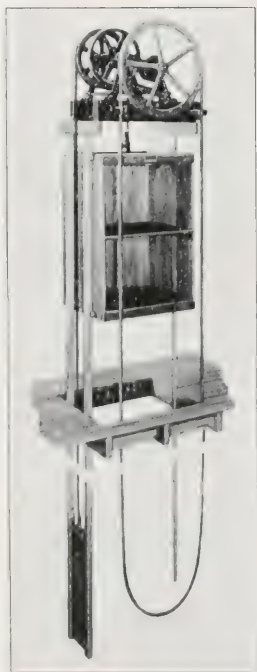
ALL KINDS—PORTABLE SECTIONAL
ALSO BUILT IN CORK and CEMENT



COLD STORAGE INSULATION
COOLING ROOMS
COLD STORAGE DOORS AND WINDOWS

Thirty-five years' experience in the manufacture of refrigerators, cooling rooms and cold storage houses at your service.

Let our engineering department solve all your refrigerator problems. They are glad to assist you any time, gratis, in planning layouts, making suggestions as to construction, securing proper circulation of refrigeration, etc. Try us.



Hand Power Dumb Waiters of every description

Guaranteed to be perfect in operation

LARGE STOCK
PROMPT SERVICE
QUICK ESTIMATES

D. A. MATOT
MANUFACTURERS

Main Office and Factory

1538-1546 Montana Street, CHICAGO

Phones, Lincoln 0002-3-4

MISSISSIPPI

GULFPORT

Bean, Ralph H., 702 Nat. Bank of Gulfport.

JACKSON

Hall, Powell S., 405 Manship St.

MISSOURI

KANSAS CITY

Boller, Robert O., 114 W. 10th St.
Eckland, Henry C., 609 Gumbel Bldg.
Gloyd, Galen V. R., 1016 Baltimore Ave.
Kenney, Stephen C., 609 Gumbel Bldg.
Peterson, David B., 508 Huron Bldg.
Vigean, Gregory, Jr., 205 E. Winthrop Rd.

ST. LOUIS

Barnett, T. P., Arcade Bldg.
Bradshaw, Preston J., 918 Locust St.
Brockmeyer, Edwin J., 5427 Gravois.
Brunson, Elmer A., 1976 Railway Exch.
Caldwell, Wm. Anderson, 3719 Washington Blvd.
Clymer, Harry G., Wainwright Bldg.
Davis, Neal C., 4908 Delmar Blvd.
Gruen, Wm. H., 1520 Chestnut St.
Helmuth, George W., Commercial Bldg.
Helmuth, Henry L., Commercial Bldg.
Henderson, Gale E., 1398 Arcade Bldg.
Imbs, Thomas F., 506 Wainwright Bldg.
Ittner, Wm. B., 408 Board of Education Bldg.
Jacobs, Charles N., 1010 S. Jefferson St.
Kennedy, John W., 1st Nat. Bank Bldg.
Kennerly, Geo. H., Title Guaranty Bldg.
Kirchner, H. William, 706 Chestnut Ave.
Klingensmith, Paul O., 317 N. 11th St.
Klipstein, Ernest C., 316 N. 8th St.
Klutho, Victor J., Syndicate Trust Bldg.
Knobel, Wilbert G., 906 Sidney St.
Knox, Raymond K., 1373 Arcade Bldg.
La Beaume, Louis E., 720 Compton Blvd.
Levy, Will, 425 Locust St.
Long, Chester V., 4301 S. 38th St.
Maritz, Raymond E., 1113 Chemical Bldg.
Mauran, John Lawrence, 721 Olive St.
Pendleton, Louis B., 114 N. 7th St.
Rathmann, Walter L., 316 N. 8th St.
Riester, Frank P., 531 Murphy Bldg.
Roach, H. F., 915 Olive St.
Russell, E. J., 1620 Chemical Bldg.
Schopp, Lawrence O., 3832 Washington Blvd.
Stauder, Adolph F., 6032 S. Kingshighway.
Stiegemeier, Oliver Wm., 1111 Title Guaranty Bldg.
Study, Guy, 1367 Arcade Bldg.
Teasdale, John W., 1005 1st Nat. Life Bldg.
Trueblood, Wilbert T., 1520 Chemical Bldg.
Watson, Jesse N., 1508 Chemical Bldg.
Wedemeyer, William, 105 N. 7th St.
Wessbecher, Louis, Buder Bldg.
Wuest, Gustav P., 922 Wainwright Bldg.
Young, William Ridgeley, Chemical Bldg.

NEBRASKA

OMAHA

Wellman, William Thomas, 3848 Cass St.

NEW YORK

BROOKLYN

Sjolin, Gosta, 10 Romsen St.

BRONX

Hermann, Paul, 705 Summit Ave.

LONG ISLAND CITY

McCullough, Ernest, 4123—47th St.

MOUNT VERNON

Gilbert, George H., 1st Nat. Bank Bldg.

NEW YORK CITY

Budina, Adolph O., 200 W. 57th St.
Church, Walter S., 85 9th Ave.
Day, Warren W., 373 Fourth Ave.
Ebersson, Drew Calvin, 200 W. 57th St.
Ebersson, John, 200 W. 57th St.
Ephraim, George, 684 Riverside Drive.
Fellheimer, Alfred, 155 E. 42d St.
Francisco, Ferris Le Roy, 511 Fifth Ave.
Franzheim, H. Kenneth, 345 Madison Ave.
Hewitt, George, 53 Park Pl.
Hiss, Philip, 18 E. 49th St.
Hoffman, Emil J. T., 485 Fifth Ave.
Hopkins, J. Edwin, 41 Park Row.
Jacobus, Robert F., 511 Fifth Ave.
Kattelle, Walter R., 80 John St.
Lee, Elsworth M., 53 Park St.
Lindeberg, Harrie T., 2 W. 47th St.
Mann, Horace B., 70 E. 45th St.
Math, Earl R., 80 John St.
Murgatroyd, Everett, 285 Madison Ave.
Ogden, Palmer H., 285 Madison Ave.
Platt, Charles A., 101 Park Ave.
Preis, Carl G., 230 Park Ave.
Rocker, Philip, 6 E. 46th St.
Schneberger, John G., 1501 Broadway.
Thomas, Andrew J., 2 W. 46th St.
Torrance, James R., 85 9th Ave.
Visscher, Theodore C., 51 E. 42d St.
Wagner, Steward, 155 E. 42d St.
Westervelt, John C., 36 W. 39th St.
Zimmermann, Albert G., 85 9th Ave.

NORTH CAROLINA

ASHEVILLE

Dreyer, Detlef J., 78 Patton Ave.
Kane, Robert L., 6 Wall St., Box 1613.

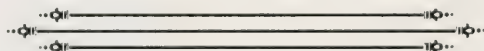
NORTH DAKOTA

GRAND FORKS

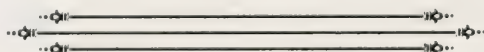
Ellis, Charles L., University of N. D.

ENTERPRISE MARBLE COMPANY

FABRICATORS



We specialize in
**Fine Bank, Fixture and Building
Installations**



FACTORY AND OFFICE

1141 NEWPORT AVENUE

Telephone Graceland 6940

CHICAGO, ILLINOIS

OHIO

AKRON

De Arment, Frank H., 404 Everett Bldg.

CORALOPSIS

Wolfe, George F., 721 Montrose St.

DAYTON

Hanna, John Paul, Nat. Recording Pump Co.

Simpson, Edwin F., 922 Reibold Bldg.

TOLEDO

Mills, Geo. S., Ohio Bldg.

YELLOW SPRINGS

Laist, Theodore F.

OKLAHOMA

OKLAHOMA CITY

Gamble, L. Jay, 411 E. 7th St.

STILLWATER

Spencer, Robert G., 602 Hester St.

TULSA

Thorne, A. Thomsen, 323 Otis Bldg.

OREGON

PORTLAND

Howell, Leslie D., U. S. Natl. Bank Bldg.

Purcell, Wm. G., 743 Georgia Place.

PENNSYLVANIA

PHILADELPHIA

Gustafson, Carl A., 1300 Widener Bldg.

Klauder, Charles Z., 1429 Walnut St.

Stuckert, F. Russell, 1600 Arch St.

PITTSBURGH

Hodgkins, Howard G., Jones Law Bldg.

Hogner, Pierre R. L., 205 Smithfield Bldg.

Kennedy, Julian, Bessemer Bldg.

McMullen, Leo A., 900 Renshaw Bldg.

Perry, William R., 1310 Rutherford Ave.

Prack, Bernhard H., 119 Federal St.

SCRANTON

Miller, Charles A., 748 Madison Ave.

RHODE ISLAND

PROVIDENCE

Sheldon, Arthur W., Hospital Trust Bldg.

TENNESSEE

NASHVILLE

Wallace, Wellington J. H., 167 8th Ave., N.

TEXAS

EL PASO

Herlin, Geo. W., 401 N. Santa Fe St.

Wuehrmann, William, Two Republics Bldg.

FORT WORTH

Patterson, Joseph J., 1915 Dartmore Pl.

WASHINGTON

CHENAI

Rounds, Fred G., Advocate Bldg.

WISCONSIN

ELKHORN

Schoenfeldt, Frank, 1 Wandawego Hotel.

GREEN BAY

Oppenhamer, William Adam, 408 Bellin Bldg.

LA CROSSE

Dockendorff, Bernhard, Box 785.

Parkinson, Albert E., Box 785.

MADISON

Claude, Louis W., 8 S. Carroll Ave.

Lagergren, Gustav A., 424 N. Patterson St.

Law, Edward John, 1 S. Pinckney St.

Law, James R., 1 S. Pinckney St.

Mead, Daniel W., 115 S. Carroll Ave.

Potter, Ellis J., 1427 Rutledge St.

Pugh, Myron E., 15 W. Main St.

Teesdale, Lawrence V., c/o Forest Products Laboratories.

Weiler, Joseph J., 315 N. Pickney St.

MILWAUKEE (Milwaukee Co.)

Brielmaier, Joseph, 1st Nat. Bank Bldg.

Brust, Peter, 105 Wells St.

Byerly, Fred I., 737 Farwell Ave.

Davis, Jerome R., 377 National Bank Bldg.

Foster, John W., 534 Caswell Bldg.

Frank, Armin C., Box 111, A, Route 2.

Gilman, Alfred T., 210 Mason St.

Gruhl, Clarence J., 940 Richard St.

Hengels, Henry C., 445 Milwaukee Ave.

Hunt, Leigh, 1678 Humboldt St.

Kirchoff, Roger C., 210 Michigan Ave.

Kloppenburg, Ralph H., 693 Cramer St.

Phillip, Richard, 405 Broadway.

Voell, Richard F., 1576 Farwell Ave.

RACINE

Hoffman, Frank J., 503 Janes Bldg.

Matson, Gustave Mandore, 528 Baker Blk.

OUTSIDE OF U. S.

CHINA

PEKIN

Hussey, Harry H., No. 1 Ta Soo Chow, Hutung.

ESTABLISHED 1870

RANDOLPH 1760



Asphalt Mastic Floors
Acid-proof Mastic Floors
Heavy Duty Trucking
Floors

For

ALL TYPES OF INDUSTRIAL PLANTS
R. R. FREIGHT AND PASSENGER
TERMINALS
SCHOOLS AND COLLEGES

Ask for Specifications, Samples and Quotations



PLANTS:

Clearing, Ill. Chicago, Ill.

MAIN OFFICES:

Builders Building, 165 W. Wacker Drive, Chicago

60 YEARS OF SERVICE

Illinois Society of Architects

OFFICERS

1929-1930

ALFRED GRANGER, President	333 N. Michigan Ave.
WILLIAM P. FOX, 1st Vice-President	38 S. Dearborn St.
GEORGE B. HELMLE, 2nd Vice-President	Springfield, Ill.
ROBERT C. OSTERGREN, Treasurer	155 N. Clark St.
WALTER A. McDOUGALL, Secretary	350 N. Clark St.
H. L. PALMER, Financial Secretary	1015 160 N. La Salle St.

DIRECTORS

FRANK E. DAVIDSON	53 W. Jackson Blvd.
EMERY STANFORD HALL	175 W. Jackson Blvd.
BYRON H. JILLSON	222 W. Adams St.
LEON E. STANHOPE	55 E. Washington St.
HARRY B. WHEELOCK	64 W. Randolph St.
HOWARD J. WHITE	80 E. Jackson Blvd.

BOARD OF ARBITRATION

FRANK A. CARPENTER	Rockford, Ill.
N. MAX DUNNING	310 S. Wabash Ave.
ELMER C. JENSEN	39 S. La Salle St.
JOSEPH C. LLEWELLYN	38 S. Dearborn St.
GEORGE C. NIMMONS	333 N. Michigan Ave.
IRVING K. POND	180 N. Michigan Ave.
RICHARD E. SCHMIDT	104 S. Michigan Ave.

EDITOR MONTHLY BULLETIN

F. E. DAVIDSON, Editor	1448 Monadnock Block.
LEON E. STANHOPE	55 E. Washington St.

STANDING COMMITTEES

Budget Committee

WALTER A. McDOUGALL	Secretary
H. L. PALMER	Financial Secretary
ROBERT C. OSTERGREN	Treasurer

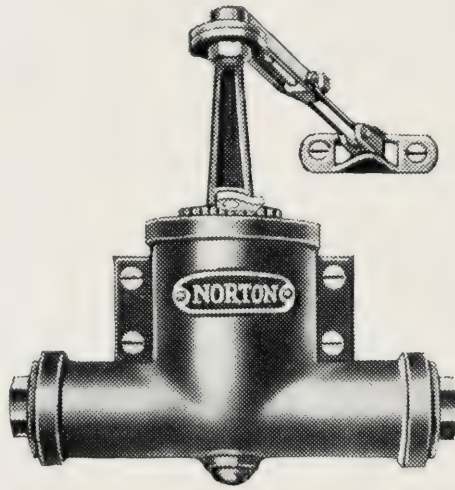
Building Valuations Committee

ROBT. C. OSTERGREN, Chairman	155 N. Clark St.
F. E. DAVIDSON	53 W. Jackson Blvd.
E. S. HALL	175 W. Jackson Blvd.
WALTER A. McDOUGALL	350 N. Clark St.
BYRON H. JILLSON	222 W. Adams St.
RICHARD E. SCHMIDT	104 S. Michigan Ave.
HARRY B. WHEELOCK	64 W. Randolph St.

Co-operation with Consulting Engineers

TIRRELL J. FERRENZ	720 N. Michigan Blvd.
------------------------------	-----------------------

NORTON "HOLDER ARM" DOOR CLOSER



THE ONLY GENUINE NORTON CLOSER

NORTON DOOR CLOSER CO.

2900 North Western Avenue

CHICAGO, ILL.

Credentials Committee

HARRY B. WHEELOCK, Chairman	64 W. Randolph St.
WALTER A. McDOUGALL	350 N. Clark St.
H. L. PALMER	160 N. La Salle St.

Committee on Education

CHAS. D. FAULKNER, Chairman	301 N. Michigan Ave.
GEO. C. NIMMONS	333 N. Michigan Ave.
HOWARD J. WHITE	80 E. Jackson Blvd.
PROF. JAMES M. WHITE	Urbana, Ill.
AUGUST C. WILMANN	35 S. Dearborn St.

Entertainment Committee

WILLIAM P. FOX, Chairman	38 S. Dearborn St.
F. E. DAVIDSON	53 W. Jackson Blvd.
H. L. PALMER	160 N. La Salle St.
CLARENCE E. FRAZIER	64 W. Randolph St.
JOHN REED FUGARD	219 E. Superior St.
LEON F. URBAIN	1254 Lake Shore Drive
BYRON H. JILLSON	222 W. Adams St.

Legislative Committee

F. E. DAVIDSON, Chairman	53 W. Jackson Blvd.
B. L. HULSEBUS	Peoria, Ill.
FRANK O. DE MONEY	30 N. La Salle St.
GEORGE B. HELMLE	Springfield, Ill.
ROBT. S. DE GOLYER	307 N. Michigan Ave.

Materials and Methods Committee

TIRRELL J. FERRENZ, Chairman	720 N. Michigan Blvd.
JOHN J. DAVEY	431 S. Dearborn St.
STANLEY D. FAIRCLOUGH	809 Exchange Ave.
RAPHAEL N. FRIEDMAN	28 E. Jackson Blvd.
ROBT. G. OSTERGREN	155 N. Clark St.

Membership Committee

H. L. PALMER, Chairman	160 N. La Salle St.
F. M. BERNHAM	5257 Cottage Grove Ave.
LEON F. URBAIN	1254 Lake Shore Drive
MARTIN R. CARPENTER	176 W. Adams St.
CARL HAUBER	25 E. Jackson Blvd.
ARCHIE H. HUBBARD	38 S. Dearborn St.

Committee on Public Action

HARRY B. WHEELOCK, Chairman	64 W. Randolph St.
FRANK A. CARPENTER	Rockford, Ill.
ROBERT S. DE GOYLER	307 N. Michigan Ave.
ALBERT P. DIPPOLD	3948 Cottage Grove Ave.
GEORGE B. HELMLE	Springfield, Ill.
HERBERT HEWETT	Peoria, Ill.
WALTER A. McDOUGALL	350 N. Clark St.
ALBERT M. SAXE	212 E. Superior St.
WILLIAM H. SCHULZKE	Moline, Ill.
MEYER J. STURM	Evanston, Ill.

JAS. SWANSON & SON

164 N. CLINTON STREET
CHICAGO, ILLINOIS

Hardware
←— for —→
Buildings



Custom Made Hardware in
Wrought Iron, Brass and
Bronze. For Residences
and Other Special Work



TELEPHONE RANDOLPH 5275

Publication Committee

EMERY STANFORD HALL, Chairman	175 W. Jackson Blvd.
FRANK E. DAVIDSON	53 W. Jackson Blvd.
JOHN REED FUGARD	219 E. Superior St.
LEON E. STANHOPE	55 E. Washington St.

Publicity and Promotion Committee

ROBT. S. DE GOLYER, Chairman	307 N. Michigan Blvd.
N. MAX DUNNING	310 S. Wabash Ave.
MEYER J. STURM	Evanston, Ill.
JOSEPH T. FORTIN	600 Blue Island Ave.
DAVIS D. MEREDITH	222 W. Adams St.
NATHANIEL KOENIGSBERG	155 N. Clark St.
ARTHUR WOLTERS DORF	360 N. Michigan Ave.
N. MAX DUNNING	310 S. Wabash Ave.

Representing the Illinois Society of Architects in the American Society for Testing Materials

TIRRELL J. FERRENZ, Chairman	720 N. Michigan Ave.
--	----------------------

State Building Code Committee

RICHARD E. SCHMIDT, Chairman	104 S. Michigan Ave.
GEORGE B. HELMLE	Springfield, Ill.
GEORGE C. NIMMONS	333 N. Michigan Ave.

Lumber Practice Committee

TIRRELL J. FERRENZ	720 N. Michigan Ave.
------------------------------	----------------------

Municipal Art Committee

THOS. E. TALLMADGE, Chairman	160 N. La Salle St.
CHARLES L. MORGAN	333 N. Michigan Ave.
HOWARD L. CHENEY	80 E. Jackson Blvd.

Legal Service Committee

Composed of Entire Board of Directors

Resolutions Committee

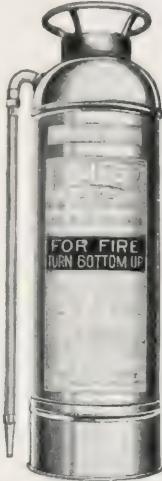
IRVING K. POND, Chairman	180 N. Michigan Ave.
JOHN G. BOLLENBACHER	333 N. Michigan Ave.
ARTHUR WOLTERS DORF	360 N. Michigan Ave.
H. L. PALMER	160 N. La Salle St.
RICHARD G. PIERCE	222 W. Adams St.

GEO. W. DIENER MFG. CO.

400 N. Monticello Avenue

CHICAGO, ILL.

Extinguishers



2 1/2 Gallon Foam Type

The 2 1/2-Gallon Foam Type Extinguisher shown here ejects 20 gallons of thick, durable foam—having a blanketing effect on burning liquids.

Essential at all times where gasoline, oil, enamel, grease or lacquer is used or stored.

2 1/2 Gallon Non-Freezing Extinguisher

The solution in this special Diener extinguisher will stand a temperature of 40 degrees below zero.

Where an approved 2 1/2-gallon machine is required, and the ordinary type extinguisher cannot be used, then you must have a Non-Freezing extinguisher. Excellent for unheated buildings.



5-Gallon Pump Tank Extinguisher

This extinguisher takes water from any source—especially well suited for use in heated buildings.

Send for the Diener Catalog of Fire Protection Appliances Now!

Diener Fire Appliances are labeled by the National Board of Fire Underwriters, and the Associated Factory Mutual Fire Insurance Companies.



Safety and Waste Cans

Excelsior Cans

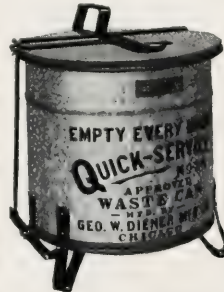
For properly and safely storing excelsior, straw or hay, clean waste or waste paper, the "Perfection" is unexcelled. Made of heavy galvanized steel.



The construction is of heavy galvanized steel. Top edge of can and corners are reinforced with angle iron, closely riveted. Corner angles or legs raise the can 3 inches from floor.

Hinged cover is reinforced by band steel, overlapping angle top, making a snug fit.

Oily Waste Cans



Our Quick-Service foot-operated oily waste can is a sure safeguard against the "oily rag" fire hazard. For strictest economy and extreme efficiency in the shop or garage equip with Quick-Service, foot-operated self-closing oily waste cans.

Safety Can

Designed to store and properly handle all volatile explosive liquids. Can is absolutely non-explosive. Leaded plate is used in construction of cans. Sizes range from 1 pint to 10 gallons.



You are invited to confer with our Service Department. Let them assist you in specifying Fire Protection Equipment that will get for you the lowest possible ratings.

For Home, Office and Factory

PAST OFFICERS

1897

John M. Van Osdel, President.
Harry B. Wheelock, 1st Vice-President.
Samuel A. Treat, 2d Vice-President.
Lawrence G. Hallberg, Treasurer.
Charles R. Adams, Secretary.

1898

Harry B. Wheelock, President.
Samuel A. Treat, 1st Vice-President.
Normand S. Patton, 2d Vice-President.
Lawrence G. Hallberg, Treasurer.
Charles R. Adams, Secretary.

1899

Samuel A. Treat, President.
Normand S. Patton, 1st Vice-President.
George Beaumont, 2d Vice-President.
O. H. Postle, Treasurer.
Charles R. Adams, Secretary.

1900

George Beaumont, President.
Charles W. Nothnagel, 1st Vice-President.
Lawrence G. Hallberg, 2d Vice-President.
Samuel A. Treat, Treasurer.
Charles R. Adams, Secretary.

1901

George Beaumont, President.
Emery Stanford Hall, 1st Vice-President.
Edgar M. Newman, 2d Vice-President.
Samuel A. Treat, Treasurer.
Charles R. Adams, Secretary.

1902

Emery Stanford Hall, President.
Edgar M. Newman, 1st Vice-President.
Arthur F. Woltersdorf, 2d Vice-President.
Samuel A. Treat, Treasurer.
Charles R. Adams, Secretary.

1903

Edgar M. Newman, President.
Arthur F. Woltersdorf, 1st Vice-President.
Henry Lord Gay, 2d Vice-President.
Samuel A. Treat, Treasurer.
Charles R. Adams, Secretary.

1904

George L. Pfeiffer, President.
William W. Clay, 1st Vice-President.
S. Milton Eichberg, 2d Vice-President.
Samuel A. Treat, Treasurer.
Charles R. Adams, Secretary.

1905

William C. Clay, President.
Joseph T. Fortin, 1st Vice-President.
Charles J. Furst, 2d Vice-President.
Samuel A. Treat, Treasurer.
Charles R. Adams, Secretary.
H. L. Palmer, Asst. Secretary.

1906

Harry B. Wheelock, President.
Charles J. Furst, 1st Vice-President.
Robert C. Berlin, 2d Vice-President.
Samuel A. Treat, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1907

Normand S. Patton, President.
Arthur F. Woltersdorf, 1st Vice-President.
Irving K. Pond, 2d Vice-President.
Samuel A. Treat, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1908

Irving K. Pond, President.
Richard G. Schmid, 1st Vice-President.
Edmund R. Krause, 2d Vice-President.
Samuel A. Treat, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1909

George Beaumont, President.
Samuel N. Crowen, 1st Vice-President.
Leon E. Stanhope, 2d Vice-President.
Samuel A. Treat, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1910

Arthur F. Woltersdorf, President.
Robert C. Berlin, 1st Vice-President.
Argyle E. Robinson, 2d Vice-President.
Samuel N. Crowen, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1911

Julian Barnes, President.
Argyle E. Robinson, 1st Vice-President.
Peter J. Weber, 2d Vice-President.
Samuel N. Crowen, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1912

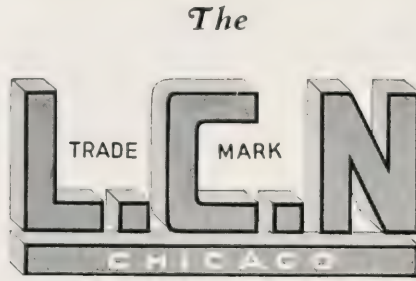
Argyle E. Robinson, President.
George W. Maher, 1st Vice-President.
George Beaumont, 2d Vice-President.
Samuel N. Crowen, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1913

Meyer J. Sturm, President.
Arthur F. Woltersdorf, 1st Vice-President.
Joseph C. Llewellyn, 2d Vice-President.
Samuel N. Crowen, Treasurer.
Emery Stanford Hall, Secretary.
H. L. Palmer, Asst. Secretary.

1914

Emery Stanford Hall, President.
Frank E. Davidson, 1st Vice-President.
John Devereux York, 2d Vice-President.
Samuel N. Crowen, Treasurer.
John Reed Fugard, Secretary.
H. L. Palmer, Financial Secretary.



Complete Line of

DOOR CLOSERS

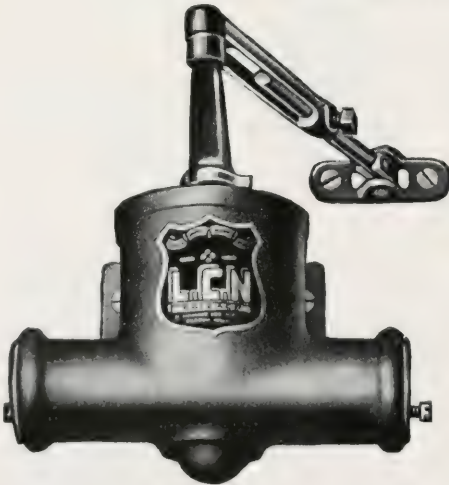
consists of

OVERHEAD CLOSERS

FLOOR CLOSERS

CONCEALED OVERHEAD CLOSERS

DOOR HOLDERS



QUALITY

CONTROL

2 SPEEDS

SERVICE



Manufactured by

NORTON LASIER COMPANY

Incorporated

Telephone Superior 7109

466 West Superior Street

CHICAGO, ILL.

1915

Frank E. Davidson, President.
 Stafford Fox Thomas, 1st Vice-President.
 Robert Seth Lindstrom, 2d Vice-President.
 Samuel N. Crowen, Treasurer.
 John Reed Fugard, Secretary.
 H. L. Palmer, Financial Secretary.

1916

Frank E. Davidson, President.
 Stafford Fox Thomas, 1st Vice-President.
 William G. Carnegie, 2d Vice-President.
 Samuel N. Crowen, Treasurer.
 John Reed Fugard, Secretary.
 H. L. Palmer, Financial Secretary.

1917

Stafford Fox Thomas, President.
 Arthur F. Hussander, 1st Vice-President.
 James B. Dibelka, 2d Vice-President.
 Samuel N. Crowen, Treasurer.
 John Reed Fugard, Secretary.
 H. L. Palmer, Financial Secretary.

1918

George W. Maher and Arthur F. Hussander,
 Presidents.
 Arthur F. Hussander, President.
 James B. Dibelka, 1st Vice-President.
 George W. Maher, 2nd Vice-President.
 Samuel N. Crowen, Treasurer.
 George A. Knapp, Secretary.
 H. L. Palmer, Financial Secretary.

1919

Charles Herrick Hammond, President.
 Robert C. Berlin, 1st Vice-President.
 N. Max Dunning, 2nd Vice-President.
 John A. Armstrong, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1920

Frank E. Davidson, President.
 Herbert E. Hewitt, 1st Vice-President.
 John A. Nyden, 2nd Vice-President.
 John A. Armstrong, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1921

Frank E. Davidson, President.
 Herbert E. Hewitt, 1st Vice-President.
 John A. Nyden, 2nd Vice-President.
 John A. Armstrong, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1922

Frank E. Davidson, President.
 Chas. E. Fox, 1st Vice-President.
 Herbert E. Hewitt, 2nd Vice-President.
 Robert C. Ostergren, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1923

Charles E. Fox, President.
 Byron H. Jillson, 1st Vice-President.
 Herbert E. Hewitt, 2nd Vice-President.
 Robert C. Ostergren, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1924

Charles E. Fox, President.
 Byron H. Jillson, 1st Vice-President.
 Frank A. Carpenter, 2nd Vice-President.
 Robert C. Ostergren, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1925

Charles E. Fox, President.
 Byron H. Jillson, 1st Vice-President.
 Frank A. Carpenter, 2nd Vice-President.
 Robert C. Ostergren, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1926

Leon E. Stanhope, President.
 Byron H. Jillson, 1st Vice-President.
 George B. Helmle, 2nd Vice-President.
 Robert C. Ostergren, Treasurer.
 Ralph C. Harris, Secretary.
 H. L. Palmer, Financial Secretary.

1927

Leon E. Stanhope, President.
 Howard J. White, 1st Vice-President.
 George B. Helmle, 2nd Vice-President.
 Robert C. Ostergren, Treasurer.
 Walter A. McDougall, Secretary.
 H. L. Palmer, Financial Secretary.

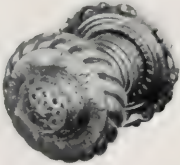
1928

Howard J. White, President.
 Robert S. De Golyer, 1st Vice-President.
 George B. Helmle, 2nd Vice-President.
 Robert J. Ostergren, Treasurer.
 Walter A. McDougall, Secretary.
 H. L. Palmer, Financial Secretary.

MEMBERS

Abel, Lester A., 7019 Merrill Ave.
 Almqvist Carl M., 118 N. La Salle St.
 Alschuler, Alfred S., 28 E. Jackson Blvd.
 Ansel, Anton, 1115 Wisconsin Ave., Oak
 Park, Ill.
 Armstrong, John A., 127 N. Dearborn St.
 Ashby, Wilbert B., 1511 W. Jackson Blvd.
 Aschauer, C. J., Citizens Bank Bldg., Decatur,
 Illinois.
 Bannister, Geo. S., 115 S. Dearborn St.
 Barfield William G., 58 W. Washington St.
 Barnes, Allen L., 1007 N. Taylor Ave.,
 Oak Park, Ill.

Barthel, J. Bernard, 3341 N. Hamilton Ave.
 Barton, Francis M., 3815 W. Congress St.
 Baumeister, Geo. E., 7817 Michigan Ave.
 Beaudry, Ralph L., 1444 E. 65th St.
 Bean, Ralph H., 702 Nat. Bank of Gulfport,
 Gulfport, Miss.
 Bein, Maurice L., 100 N. La Salle St.
 Beman, S. S., 105 W. Monroe St.
 Benson, Edward, 5153 N. Clark St.
 Berlin, R. C., 228 N. La Salle St.
 Bernham, F. M., 5257 Cottage Grove Ave
 Bishop, Thomas R., 35 S. Dearborn St.
 Bjork, David T., 228 N. La Salle St.



Importers
of
French
and
English
Decorative
Hardware



Designers
and
Manufacturers
of
Wrought Iron
and
Bronze
Hardware

Pine Room, Executive Offices
Carbide & Carbon Co., 230 North Michigan Ave.
Burnham Bros. Inc., Architects
New England Brownstone hearth and fireplace equipment
by Illinois Hardware Co.

Stair Railings, Gates, Grilles, Fireplace Fixtures

You are Invited to Visit our Showrooms

*We Maintain a Competent Force of Hardware Experts Who Will Assist
You with Your Hardware Problems*

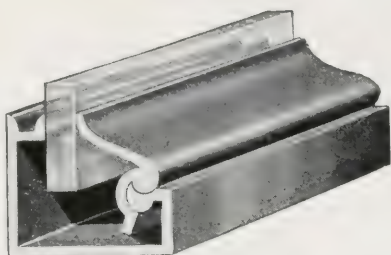
ILLINOIS HARDWARE COMPANY

230 North Michigan Avenue

Central 5484

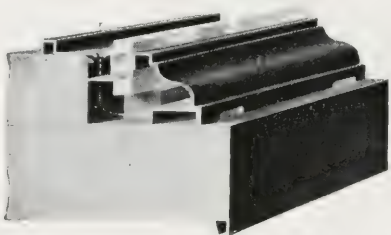
CHICAGO

Blondin, Edward A., 1859 E. 71st St.
 Bohasseck, Charles, 900 N. Michigan Ave.
 Bollenbacher, John C., 333 N. Michigan Ave.
 Bouchard, Louis C., 205 W. Wacker Drive.
 Bourgeois, Louis, 536 Sheridan Rd., Wilmette, Ill.
 Braband, F. J. E., 901 Wrightwood Ave.
 Bradley, Chas. W., Brown Bldg., Rockford, Ill.
 Bradshaw, Preston J., 718 Locust St., St. Louis, Mo.
 Braun, Wm. T., 58 E. Washington St.
 Bristle, Joseph H., 160 N. La Salle St.
 Brockmeyer, Edwin V., 5427 Gravoil Ave., St. Louis, Ill.
 Bruns, Benedict J., 1951 Irving Park Blvd.
 Buckingham, Clarence W., 339 Grove St. Jacksonville, Ill.
 Buerger, Albert J., 5515 W. Division St.
 Burgess, Ralph R., 39 S. La Salle St.
 Burnham, D. H., 160 La Salle St.
 Burnham, Hubert, 160 N. La Salle St.
 Buser, Nathaniel E., Mount Morris, Ill.
 Byerly, F. I., 737 Farwell Ave., Milwaukee, Wis.
 Capraro, Alexander, 7 S. Dearborn St.
 Carnegie, Wm. G., 228 N. La Salle St.
 Carpenter, Frank A., 226 S. Main St., Rockford, Ill.
 Carpenter, Martin R., 176 W. Adams St. St.
 Carr, Chas. Alban, 529 Belden Ave.
 Cauley, Frank Wm., 1619 Howard Ave.
 Cerny, Jerome J., 1444 S. Crawford Ave.
 Chatten, Melville C., 160 N. La Salle St.
 Chase, Frank D., 720 N. Michigan Ave.
 Cheney, Howard Lovewell, 80 E. Jackson Blvd.
 Christensen, Chas. Werner, 2454 Farwell St.
 Christensen, John C., 822 Franklin Ave., River Forest, Ill.
 Christie, Louis R., 379 Hill Ave., Glen Ellyn, Ill.
 Chubb, John D., 109 N. Dearborn St.
 Clark, Charles R., Sheldon, Ill.
 Clark, Edwin H., 8 E. Huron St.
 Clark, Robert C., 7216 Harvard Ave.
 Coffin, A. S., 6 N. Michigan Ave.
 Cohen, Joseph, 160 N. La Salle St.
 Cook, Norman W., 5842 Wayne Ave.
 Conway, Wm. H., 104 East Side Square, Springfield, Ill.
 Coughlen, Gardner C., 1923 Calumet Ave.
 Coyle, John E., 315 E. Jefferson St., Joliet, Ill.
 Crowen, S. N., 8 S. Michigan Ave.
 Culver, Harry K., 1365 Greenleaf Ave.
 Dalsey, Harry I., 64 W. Randolph St.
 Davey, John J., 431 S. Dearborn St.
 Davidson, F. E., 53 W. Jackson Blvd.
 Davis, George H., 527 Moss St., Peoria, Ill.
 Davis, Zachary T., 400 N. Michigan Ave.
 Day, Warren W., 373 Fourth St.
 De Golyer, Robert S., 307 N. Michigan Ave.
 De Money, Frank O., 30 N. La Salle St.
 Dippold, Albert P., 3948 Cottage Grove Ave.
 Doerr, Harold F., 11006 S. Michigan Ave.
 Doerr, William Phillip, 28 E. Jackson Blvd.
 Dougherty, Floyd E., 35 N. Dearborn St.
 Dowling, E. F., 646 N. Michigan Ave.
 Drainie, John G., 32 W. Randolph St.
 Dreyer, Detlef J., 78 Patton Ave., Asheville, N. C.
 Drielsma, J. Arthur, 1033 Loyola Ave.
 Drummond, Wm., 547 Edgewood Pl., River Forest, Ill.
 Dubin, Geo. H., 14 W. Washington St.
 Dunning, N. Max, 310 S. Wabash Ave.
 Eberson, John, 200 W. 57th St.
 Eckland, Henry, 609 Gumbel Bldg., Kansas City, Mo.
 Eichberg, S. M., 64 W. Randolph St.
 Emerson, Frank N., 1600 Peoria Life Bldg., Peoria, Ill.
 Ermeling, Ralph W., 58 E. Washington St.
 Esser, Curt A., 38 S. Dearborn St.
 Fairclough, Stanley D., 809 Exchange Ave., U. S. Yards.
 Faulkner, Chas D., 307 N. Michigan Ave.
 Ferree, Harold C., 378 Grand Ave.
 Ferrenz, Tirrell J., 720 N. Michigan Ave.
 Fiddelke, H. G., 1025 Superior St., Oak Park.
 Finck, Sidney C., 35 S. Dearborn St.
 Fischer, Frederick William, 9129 Commercial Ave.
 Fischer, John B., 140 S. Dearborn St.
 Fishman, M. Maurice, 228 N. La Salle St.
 Flaks, Francis A., 1956 S. Springfield Ave.
 Fletcher, Robert C., 179 W. Washington.
 Flinn, Raymond W., 8 S. Dearborn St.
 Floto, Julius, 176 W. Adams St.
 Fogel, Reuben W., 2329 Winnemac Ave.
 Foltz, Frederick C., 510 N. Dearborn St.
 Fortin, Joseph T., 600 Blue Island Ave.
 Foster, Wm. G., 645 Country Rd., Beverly Hills, Cal.
 Fox, John J., 38 S. Dearborn St.
 Fox, Wm. P., 38 S. Dearborn St.
 Franklin, Robert L., 160 N. La Salle St.
 Frazier, Clarence F., 64 W. Randolph St.
 Friedman, Raphael N., 28 E. Jackson Blvd.
 Frodin, Rube S., 808, 30 N. Michigan Ave.
 Frommann, Emil H., 64 W. Randolph St.
 Frost, Charles S., 105 S. La Salle St.
 Fry, Frank L., 140 S. Dearborn St.
 Fugard, John Reed, 219 E. Superior St.
 Furst, Wm. H., 127 N. Dearborn St.
 Gaddis, John W., Am. Nat. Bank Bldg., Vincennes, Ind.
 Gallup, Harold E., 646 N. Michigan Ave.
 Gatterdam, F. E., 6307 Holbrook Ave.
 Gauger, William, 36 W. Randolph St.
 Gaul, Herman J., 228 E. Superior St.
 Gerber, Arthur, 20 W. Jackson Blvd.
 Gemeny, Blaine B., 8050 South Park Ave.
 Gerhardt, Paul, 64 W. Randolph St.
 Gerhardt, Paul, Jr., 64 W. Randolph St.
 Gibson, Bayard K., 624 S. Michigan Ave.
 Gill, Rudolph Z., 1328 Walnut St., Murphysboro, Ill.
 Gillette, Edwin F., 691 La Loma Road, Pasadena, Calif.
 Graham, Ernest R., 80 E. Jackson Blvd.
 Granger, Alfred F., 333 N. Michigan Ave.
 Graven, Anker S., 100 N. La Salle St.



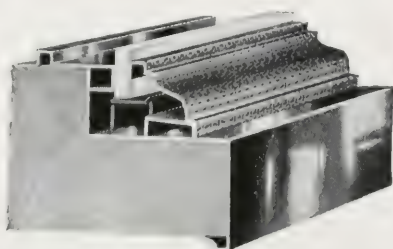
DAVIS SOLID BRONZE

without a par today for the finer stores of modern buildings. Built on the fulcrum principle, it assures utmost safety to the largest plates. All glass is set from the outside without need for putty or plastic cement.



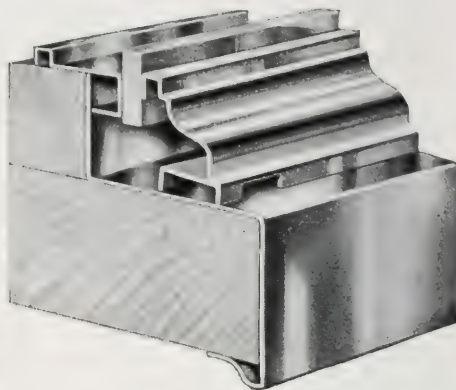
COPPER

or Bronze, the metals of proven merit, serving successfully on thousands of Brasco store fronts all over the country.



ART BRONZE

offering a distinct contribution to modern store architecture with its striking patterned effects in deep relief.



PERMAWITE

the new white setting now the vogue. A chromium-lustre *solid* white metal of marked brilliance and unusual weathering qualities—at lower cost than plated metal.

The *Latest* in Store Front Construction

With initiative in design—advanced methods of manufacture—Brasco has produced new and striking effects in *solid* white metal, art bronze, standard copper and bronze and *solid* architectural bronze for the modern store front.

Each of these is available as a complete, unified construction, adapted to the newer layouts of office and commercial buildings, hotels, apartments, department stores and individual shops.

All information—full-sized details and actual samples of all constructions—will be gladly sent on request.

BRASCO
Manufacturing Company

Factory and General Offices:

HARVEY, ILL.

Chicago Suburb

Brasco
STORE FRONTS

Graves, George Palmer, 570 Jackson Ave.,
 Glencoe, Ill.
 Gray, Frank B., 1st Nat. Bank Bldg., Aurora,
 Ill.
 Green, H. H., 49 N. Country Club Drive,
 Phoenix, Arizona.
 Griesser, Richard, 64 W. Randolph St.
 Gubbins, Wm. F., 4059 W. Monroe St.
 Guenzel, Louis, 879 N. State St.
 Haagen, Paul T., 155 N. Clark St.
 Hall, Eric E., 123 W. Madison St.
 Hall, Emery Stanford, 175 W. Jackson Blvd.
 Hamilton, John L., 814 Tower Court.
 Hammond, Charles Herrick, 160 N. La
 Salle St.
 Hanifen, John, Nertney Bldg., Ottawa, Ill.
 Hansen, Paul, 4646 Magnolia Ave.
 Harris, Ralph C., 192 N. State St.
 Hatzfeld, Clarence, 7 S. Dearborn St.
 Hauber, Carl, 25 E. Jackson Blvd.
 Hecht, Albert S., 228 N. Wells St.
 Hegsted, Martin A., 4630 Altgeld St.
 Heinz, Lorenz H., 453 W. 62nd St.
 Hellmuth, George W., Commercial Bldg.,
 St. Louis, Mo.
 Helmle, George B., First National Bank
 Bldg., Springfield, Ill.
 Helmle, Henry R., First National Bank
 Bldg., Springfield, Ill.
 Henry, Chas. D., 811 Volkman Bldg., Kan-
 kakee.
 Henschien, H. Peter, 1637 Prairie Ave.
 Hercules, J. W., 308 W. Sherman Ave., Pe-
 oria, Ill.
 Hetherington, John T., 33 S. Clark St.
 Hetherington, Murray, 33 S. Clark St.
 Hewitt, Herbert, 1600 Peoria Life Bldg.,
 Peoria, Ill.
 Himelblau, A. L., 30 N. Dearborn St.
 Hirschfield, Leo S., 228 N. La Salle St.
 Hocke, John, 1604 E. 79th St.
 Hodgdon, Charles, 134 S. La Salle St.
 Hodgkins, H. G., Jones Law Bldg., Pitts-
 burgh, Pa.
 Hogner, Lt. Perrie R. L., 205 Smithfield
 Bldg.
 Holabird, John A., 333 N. Michigan Ave.
 Holsman, Henry K., 307 N. Michigan Ave.
 Hood, Raymond M., 40 W. 40th St., New
 York, N. Y.
 Hooper, William T., 879 N. State St.
 Horn, Benjamin A., Central Trust Bldg.,
 Rock Island, Ill.
 Hosmer, Clare C., 602 Eperson Bldg., Hous-
 ton, Texas.
 Hotchkiss, Robert J., Central Nat. Bank
 Bldg., Peoria, Ill.
 Hubbard, Archie H., 38 S. Dearborn St.
 Hubbard, Bert C., 9911 S. Damen Ave.
 Huber, Julius H., 2039 Greenleaf Ave.
 Hulsebus, Bernard L., 1001 Jefferson Bldg.,
 Peoria, Ill.
 Hunt, Jarvis, 30 N. Michigan Ave.
 Hussander, A. T., 25 N. Dearborn St.
 Huszagh, Ralph D., 6 N. Michigan Ave.
 Hussey, Harry H., No. 1 Ta Soo Chow
 Huting, Pekin, China.
 Hyde, Robert M., 8 S. Dearborn St.
 Hyland, Paul V., 64 E. Lake St.
 Jacobs, Arthur, 160 N. La Salle St.
 Jensen, Clarence A., 310 S. Wabash Ave.
 Jensen, Elmer C., 39 S. La Salle St.
 Jensen, Jens J., 1105 Lawrence Ave.
 Jillson, Byron H., 222 W. Adams St.
 Johnson, Gilbert A., 129 N. Gardner St.
 Rockford, Ill.
 Johnston, W. K., 6805 Yale Ave.
 Johnstone, Percy T., 35 E. Wacker Drive.
 Jones, Wm. C., 11 S. La Salle St.
 Joy, Samuel Scott, 180 N. Michigan Ave.
 Jyrch, Karl E., Petite Park, Antioch, Ill.
 Kandl, Norman N., 7905 Cottage Grove
 Ave.
 Kane, Michael B., Bohm Bldg., Edwards-
 ville, Ill.
 Kiefer, Albert, 314 Third Ave., Peoria, Ill.
 Kingsley, Geo. S., 109 N. Dearborn St.
 Klamt, Edward A., 713 Wrightwood Ave
 Klein, Wm. J., 228 N. La Salle St.
 Kocher, Jacques J., 6405 S. Halsted St.
 Koenigsberg, Nathaniel, 155 N. Clark St.
 Kohfedt, Walter G., 180 N. Michigan Ave.
 Krieg, Arthur W., 176 W. Adams St.
 Krieg, Wm. G., 176 W. Adams St.
 Kupfer, Otto A., 1865 Millard Ave.
 Lagergren, Gustav P., 424 N. Patterson St.,
 Madison, Wis.
 Laist, Theodore F., Yellow Springs, Ohio.
 Lampe, Clarence W., 155 N. Clark St.
 Lautz, William H., 806 W. 79th St.
 Layer, Robert W., 134 N. La Salle St.
 Lehle, Louis, 502 Aldine Ave.
 Leviton, Morton, 38 S. Dearborn St.
 Levy, Alex. L., 228 N. La Salle St.
 Lewis, Jacob, 64 W. Randolph St.
 Liedberg, Hugo J., 2349 Devon Ave.
 Lindquist, Frederick, 179 W. Washington
 St.
 Lindstrand, John A., 4000 W. North Ave.
 Liska, Charles O., 38 S. Dearborn St.
 Liska, Emil, 38 S. Dearborn St.
 Llewellyn, J. C., 38 S. Dearborn St.
 Loewenberg, Israel S., 111 W. Monroe St.
 Lonck, Adolph, 3949 W. 26th St.
 Lovdall, George F., 25 N. Dearborn St.
 Lovell, Sidney, 224 E. Ontario St.
 Ludgin, Joseph G., 310 S. Michigan Ave.
 Lund, Anders G., 453 W. 63rd St.
 Lurvey, Louis, 8 Ogden Ave.
 Mahaffey, David, 127 N. Dearborn St.
 Maher, Harry E., 1564 Sherman Ave.,
 Evanston, Ill.
 Maiwurm, Arthur B., 119 Marion St., Oak
 Park, Ill.
 Mallinger, John, 3323 N. Clark St.
 Malmer, Eugene, 233 W. Park Ave., Aurora,
 Ill.
 Mann, William D., 32 W. Randolph St.
 Marshall Benjamin H., 612 Sheridan Road,
 Wilmette, Ill.
 Martin, Edgar D., 180 N. Michigan Ave.

DIENHART SERVICE

A competent advisory staff—plus our own workrooms—direct factory and mill connections with furniture, carpet and drapery fabric manufacturers—makes possible harmonious, artistic interiors at a nominal cost.



A Corner of our Display Room—George B. Dienhart & Son, Inc.

We are prepared to submit ideas, sketches and expert advice in the furnishing of interiors without charge

Our workrooms are equipped for the manufacture of window shades, draperies, upholstering, etc.

Tontine Washable, Waterproof window shades, manufactured by E. I. Du Pont de Nemours & Company, Inc., are featured in our window shade department . . .

Furniture, floor coverings and all other accessories may be obtained through our expert decorators on a brokerage basis from the largest and best known manufacturers in the country

George B. Dienhart & Son, Inc.
Furnishers of Interiors

DISPLAY ROOMS
The Builders Bldg.

WORKROOMS
187 N. La Salle St.

CHICAGO, ILLINOIS

Martini, Elisabeth A., 64 W. Randolph St.
 Marx, Elmer W., 155 N. Clark St.
 Matteson, Victor Andre, 8 S. Dearborn St.
 Maupin, James M., Commercial Bldg., Alton Ill.
 Mauran, John Lawrence, 721 Olive St., St. Louis, Mo.
 Mayger, Arthur C., 100 N. La Salle St.
 Maynard, Henry S., 26 Park Drive, Glen View, Ill.
 McArthur, Albert C., 311 W. Jefferson St., Phoenix, Arizona.
 McCarthy, Joseph W., 139 N. Clark St.
 McClellan, Edward George, 7441 Cottage Grove Ave.
 McCaughey, William F., Jr., 222 W. Adams St.
 McDonald, Luther W., 7921 Constance
 McDougall, Walter A., 350 N. Clark St.
 McEldowney, Harold B., 612 Washington Ave., Glencoe, Ill.
 McGrew, Kenneth Axtel, 1564 Sherman Ave., Evanston, Ill.
 McLane, Cyrus D., 228 N. La Salle St.
 McLaughlin, Daniel F., 171 Oakwood Ave., Downers Grove, Ill.
 Meder, Everett S., 20th Fl., 188 W. Randolph St.
 Meldahl, Jens J., 559 Surf St.
 Meredith, Davis D., 222 W. Adams St.
 Metz, Carl A. R., 307 N. Michigan Ave.
 Meyer, Frederic H., 820 Tower Court.
 Michaelsen, Christian S., 3256 Franklin Blvd.
 Miller, Chas. A., 748 Madison Ave., Scranton, Pa.
 Miller, John W., 4438 Greenwood Ave.
 Miller, Joseph A., 6440 Bosworth Ave.
 Morehouse, Merritt J., 343 S. Dearborn St.
 Morey, Arthur, 179 W. Washington St.
 Morgan, Chas. L., 333 N. Michigan Ave.
 Morrison, James R. M., 134 N. LaSalle St.
 Morse, Harry Leon, 155 N. Clark St.
 Mundie, W. B., 39 S. La Salle St.
 Nadherny, Joseph J., 38 S. Dearborn St.
 Neebe, John K., 3713 N. Kedvale Ave.
 Nelson, Joseph A., 2432 Irving Park Blvd.
 Nelson, Melvin A., 1722 N. California Ave.
 Newman, Edgar M., 107 N. Clark St.
 Nimmons, Geo. C., 333 N. Michigan Ave.
 Nitsche, Edward A., 28 E. Huron St.
 Norman, Andrew, 6353 N. Clark St.
 Nyden, John A., 190 N. State St.
 Oliver, Ralph H., 115 S. Dearborn St.
 Olsen, Leif E., 228 N. La Salle St.
 Olsen, Paul Frederick, 720 Cass St.
 Oman, Samuel H., 431 N. Michigan Ave.
 Ordning, Carl H., 1939 Chase Ave.
 Orrell, Jay C., 7800 Colfax Ave.
 Ostergren, Robert C., 155 N. Clark St.
 Otis, Samuel S., 801 Cass St.
 Pearson, Gustav E., 4000 W. North Ave.
 Perkins, Dwight H., 160 N. La Salle St.
 Perkins, Frank W., 6640 Yale Ave.
 Peterson, Edward A., 2622 E. State St., Rockford, Ill.
 Peterson, Ivan R., 1717 Broadview Ave., Highland Park, Ill.
 Pfeifferberger, Geo. D., 102 W. 3rd St., Alton, Ill.
 Pierce, Richard G., 222 W. Adams St.
 Pleins, Leo H., Div. of Architecture, Springfield, Ill.
 Pond, Irving K., 180 N. Michigan Ave.
 Prather, Fred V., 400 N. Michigan Ave.
 Pridmore, J. E. O., 38 S. Dearborn St.
 Prindeville, Chas. H., 58 E. Washington St.
 Probst, Edward, 80 E. Jackson Blvd.
 Pruyn, William H., Jr., 75 E. Wacker Drive
 Puckey, Francis W., 400 N. Michigan Ave.
 Quinn, James Edwin, 10 S. La Salle St.
 Quitsow, Anthony H., 228 N. La Salle St.
 Rae, Robert, 431 Greenleaf Ave., Wilmette.
 Raeder, Henry, 20 W. Jackson Blvd.
 Rapp, George L., 190 N. State St.
 Rathmann, Walter L., 316 N. 8th St., St. Louis, Mo.
 Reiger, Harry J., Booth Bldg., Springfield, Ill.
 Rezny, James B., 2202 S. Crawford Ave.
 Richards, H. H., 5467 Washington Blvd.
 Richardson, Jason F., Century Life Bldg.,
 Riddle, Herbert H., 75 E. Wacker Drive
 Riddle, Lewis W., 105 S. La Salle St.
 Rissman, Maurice B., 228 N. La Salle St.
 Roberts, E. E., 82 W. Washington St.
 Robertson, David, 8 S. Dearborn St.
 Robinson, Argyle E., 176 W. Adams St.
 Roedigger, F. W. C., 8214 Luella Ave.
 Rognstad, Sigurd A., 3256 Franklin Blvd.
 Rohm, Wm., 160 N. La Salle St.
 Rosen, Richard O., 10th and Cedar St., Louisville, Ky.
 Rowe, Charles B., 205 W. Wacker Drive
 Rowe, Lindley P., 205 W. Wacker Drive
 Roy, Franz, 9046 Commercial Ave.
 Royer, Joseph W., Flat Iron Bldg., Urbana.
 Rupert, Edward P., 6951 South Green St.
 Rupinski, Edward W., 2130 N. Kedzie Ave.
 Rusy, Anthony F., 1339 S. Avers Ave.
 Ruttenberg, Albert M., 64 W. Randolph St.
 Ryan, Wm. J., 180 N. Michigan Ave.
 Sanders, Lewis Miles, 30 N. Dearborn St.
 Saxe, Albert Moore, 212 E. Superior St.
 Scheller, Jesse, 7606 Crandon Ave.
 Schenck, Rudolph, 122 S. Michigan Ave.
 Schlacks, H. J., 820 Tower Court.
 Schmid Richard G., 180 N. Michigan Ave.
 Schmidt, Hugo, 1165 N. Clark St.
 Schmidt, Richard E., 104 S. Michigan Ave.
 Schoenfeldt, Frank, Wandawego Hotel, Elkhorn, Wis.
 Schoening, John A., 7335 South Park Ave.
 Schopp, Lawrence O., 3832 Washington Blvd., St. Louis, Mo.



What to Look for When Buying Awnings

- (1) *A reliable firm handling standard non-fading, lasting materials.*
- (2) *An awning shop carrying a large assortment of patterns and colors from which you can choose the proper combination for your home.*
- (3) *A designing department which can help you in making your awnings conform to the style of architecture desired and is at the service of the architect.*
- (4) *Service—You want awnings soon after you order them, not when the summer is half gone. The house you buy from should be able to manufacture and deliver quickly.*
- (5) *You want well constructed awnings—cut to fit—stout, lasting iron frames.*
- (6) *Installations by skilled men who courteously and in the quickest time possible will put up your awnings—right.*

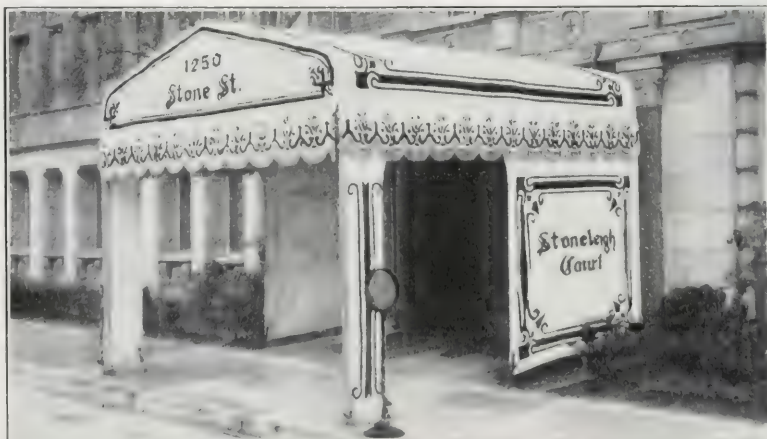
Our awning service embraces these six features. A telephone call will bring to your door one of our salesmen who can intelligently discuss with you the subject of awnings.

Awnings make the home complete

SMITH BROS.
 AWNINGS & CANOPIES
 1419 Diversey Parkway

Tel. Lakeview 6670

CHICAGO



- Schreiber George F., 801 Architects & Builders' Bldg., Indianapolis, Ind
 Schulzke, Wm. H., People's Bank Bldg., Moline, Ill.
 Schwartz., Albert A., 180 W. Washington St.
 Schwarz, Julius J., 64 W. Randolph St.
 Scribbins, John A., 600 Vernon Ave., Glen-coe, Ill.
 Seator, Sinclair M., 19 S. La Salle St.
 Shattuck, W. F., 134 N. La Salle St.
 Sheldon, Karl H., 400 N. Michigan Ave.
 Slovinec, John, 5138 S. Artesian Ave.
 Slupkowski, Joseph A., 1263 N. Paulina St.
 Smith, Harold, 1637 Prairie Ave.
 Sobel, Herbert, 30 N. Dearborn St.
 Spencer, Charles B., 180 Michigan Ave.
 Spencer, Nelson S., 180 N. Michigan Ave.
 Spieler, Herbert E., Graham Bldg., Aurora, Ill.
 Spitz, Alexander H., 220 S. State St.
 Spitzer, Herbert, 205 W. Wacker Drive.
 Spitzer, Maurice, 205 W. Wacker Drive.
 Stanhope, Leon E., 55 E. Washington St.
 Stanton, Frederick C. H., 307 N. Michigan Avenue.
 Stauduhar, George, 1608 21st St., Rock Island, Ill.
 Steif, B. Leo, 307 N. Michigan Ave.
 Steinberg, Edward, 360 N. Michigan Ave.
 Stern, Isaac S., 185 N. Wabash Ave.
 Strandel, Charles A., 3959 Lincoln Ave.
 Study, Guy, 1363 Arcade Bldg., St. Louis, Mo.
 Stuhr, Wm., 310 Safety Bldg., Rock Island.
 Sturges, Howard Putman, 727 105 N. Clark St.
 Sturm, Meyer J., 708 Church St., Evanston, Ill.
 Sturnfield, Charles H., 600 Blue Island Ave.
 Swensson, Walter F., 448 Grant Pl.
 Swern, Perry W., 228 N. La Salle St.
 Tallmadge, Thomas E., 160 N. La Salle St.
 Teesdale, Lawrence V., c/o. Forest Products Laboratory, Madison, Wis.
 Teich, Frederick, 64 W. Randolph St.
 Teisen, Axel V., 4804 N. Kedzie Ave.
 Teutsch, Carl M., 2555 Winnemac Ave.
 Thielbar, Frederick J., 219 E. Superior St.
 Thomas, Stafford F., Amherst, Mass.
 Tocha, Anton, 1064 Milwaukee Ave.
 Tomlinson, H. Webster, 106 N. Chicago Ave., Joliet, Ill.
 Urbain, Jules, Jr., 228 N. La Salle St.
 Urbain, Leon F., 1254 Lake Shore Drive.
 Urbanek, Charles A., 1423 S. Avers Ave.
 Vail, Morrison H., 1239 Holcomb Ave., De-troit, Mich.
 Van Bergen, John S., 234 Cedar St., High-land Park, Ill.
 Van der Meer, Wybe J., 214 Mead Bldg., Rockford, Ill.
 Van Gunten, Orlando, 26 E. Huron St.
 Viehe-Naess, Ivar, 180 N. Michigan Ave.
 Vitzthum, Karl M., 307 N. Michigan St.
 Wallace, Chas. L., Will County Natl. Bank Bldg., Joliet, Ill.
 Wallace, Dwight G., 22 W. Monroe St.
 Wallace, Maurice R., 924 E. 63rd St.
 Waterman, Harry Hale, 3915 Vincennes Ave.
 Watson, Jesse N., Chemical Bldg., St. Louis, Mo.
 Watson, Vernon, S., 160 N. La Salle St.
 Weber, Alfred P., 155 N. Clark St.
 Webster, Chas. Woods, Cutting Bldg., Joliet
 Wedemeyer, William, 105 N. Seventh St., St. Louis, Mo.
 Weisfeld, Leo H., 155 N. Clark St.
 Weiss, John W., 53 W. Jackson Blvd.
 Wheelock, Harry B., 64 W. Randolph St
 White, Howard J., 1417-80 E. Jackson Blvd.
 White, James M., Prof., Administration Bldg., Urbana, Ill.
 Whitmeyer, Mark H., Central Nat. Bank Bldg., Peoria, Ill.
 Wilmanns, August C., 35 S. Dearborn St.
 Winkel, Benno, 3985 W. First St., Denver, Colo.
 Wolff, Richard G., 4100 S. Albany Ave.
 Woltersdorf, A. F., 360 N. Michigan Ave.
 Worthmann, Henry, 155 N. Clark St.
 Wright, Clark C., 333 N. Michigan Ave.
 Young, Thomas C., Arcade Bldg., St. Louis, Mo.
 Youngberg, John E., 2015 Howe St., care of E. F. Anderson.
 Zelenka, Anthony James, 6001 W. 22nd St., Cicero, Ill.
 Zippwald, Otto, Lemon Grove, San Diego County, California.
 Zook R. Harold, 140 S. Dearborn St.
 Zuckerman, Benjamin F., 53 W. Jackson Blvd.

HONORARY MEMBERS

- Goodnow, Charles N., 100 N. La Salle St.
 Huber, Julius H., 2039 Greenleaf Ave.
 Palmer, H. L., 160 N. La Salle St
 Pfeiffer, Geo. L., Lemon City, Florida.

In Memoriam
LEE MILLER
JOHN MORRELL
HENRY L. NEWHOUSE
WILLIAM A. OTIS
ALLEN B. POND
WILLIAM H. PRYN, JR.



THE
NEWEST
IDEAS
IN
BRICK
AND
THEIR
USES

At our Studio you will find displayed—

FACE BRICK

All Textures and Colors

SPECIAL SHAPE BRICK

SPECIAL SIZE BRICK

SPLIT BRICK

BLOCK BRICK

OVER SIZE BRICK

HAND MADE BRICK

DRY PRESS BRICK

BRICK COTTA

ENAMELED BRICK

PORCELAIN BRICK

SALT GLAZE BRICK

SLATE ROOFS

SLATE FLAGGING

AMBASTONE

CLAY ROOFING TILE

Full Range Colors and Styles

SWIMMING POOL EQUIPMENT

BURT T. WHEELER BRICK COMPANY

1222-1234 Builders Building

228 North La Salle Street, at Wacker Drive, Chicago

WE INVITE YOU TO CALL AT OUR STUDIO

THE AMERICAN INSTITUTE OF ARCHITECTS

THE OCTAGON HOUSE, WASHINGTON, D. C.

OFFICERS

C. HERRICK HAMMOND, President.....160 N. La Salle St., Chicago, Ill.
J. MONROE HEWLETT, First Vice-President.....2 W. 45th St., New York, N. Y.
WILLIAM J. SAYWARD, Second Vice-President.....101 Marietta St. Bldg., Atlanta, Ga.
FRANK C. BALDWIN, Secretary.....The Octagon, Washington, D. C.
EDWIN BERGSTROM, Treasurer.....Citizens National Bank Bldg., Los Angeles, Cal.

BOARD OF DIRECTORS

For One Year (1929-30)

WILLIAM H. LORD.....17½ Church St., Asheville, N. C., (South Atlantic Div.)
OLLE J. LOREHN.....2900 San Jacinto St., Houston, Texas (Gulf States Div.)
MYRON HUNT.....1107 Hibernian Bldg., Los Angeles, Cal. (Sierra Nevada Div.)

For Two Years (1929-31)

CHARLES D. MAGINNIS.....Statler Bldg., Boston, Mass. (New England Div.)
CHARLES BUTLER.....56 W. 45th St., New York, N. Y. (New York Div.)
LOUIS LA BEAUME.....720 Compton Bldg., St. Louis, Mo. (Central States Div.)

For Three Years (1929-32)

FREDERICK W. GARBER.....4 W. 7th St., Cincinnati, Ohio (Great Lakes Div.)
CHARLES T. INGHAM.....1211 Empire Bldg., Pittsburgh, Pa. (Middle Atl. Div.)
FRED FIELDING WILLSON.....P. O. Box 497, Bozeman, Mont (West Mont. Div.)

LIST OF CHAPTERS, 1929

Alabama—*J. C. Halstead, 502 Lincoln Life Bldg., Birmingham, Ala.; †Jacob E. Salle, Empire Bldg., Birmingham, Ala.

Arkansas—*George H. Wittenberg, Home Insurance Bldg., Little Rock, Ark.; †Lawson L. Delony, 2407 Louisiana St., Little Rock, Ark.

Baltimore—*Laurence H. Fowler, 347 N. Charles St., Baltimore, Md.; †Henry S. T. White, 527 N. Charles St., Baltimore, Md.

Boston—*Robert P. Bellows, 8 Beacon St., Boston, Mass.; †Edward H. Prichard, One Beacon St., Boston, Mass.

Brooklyn—*Robert H. Bryson, 160 Montague St., Brooklyn, N. Y.; †George Francis Kiess, 130 E. 15th St., New York, N. Y.

Buffalo—*Harvey S. Horton, Prudential Bldg., Buffalo, N. Y.; †Benning C. Buell, 547 Franklin St., Buffalo, N. Y.

Central Illinois—*Joseph W. Royer, Flat Iron Bldg., Urbana, Ill.; †Philip R. Hooton, Peoples Bank Bldg., Bloomington, Ill.

Central New York—*Clement R. Newkirk, 258 Genesee St., Utica, N. Y.; †Egbert Bagg, 258 Genesee St., Utica, N. Y.

Chicago—*Howard L. Cheney, 80 E. Jackson Blvd., Chicago, Ill.; †Bertram A. Weber, 343 S. Dearborn St., Chicago, Ill.

Cincinnati—*Charles F. Cellarius, 906 St. Paul Bldg., Cincinnati, Ohio; †A. C. Denison, 75 Blymyer Bldg., Cincinnati, Ohio.

Cleveland—*A. H. Tashjian, 2341 Carnegie Ave., Cleveland, Ohio; †Paul Ockert, 1836 Euclid Ave., Cleveland, Ohio.

Colorado—*G. Meredith Musick, Republic Bldg., Denver, Colo.; †W. Gordon Jamieson, 1982 Broadway, Denver, Colo.

Columbus—*Daniel A. Carmichael, 5 E. Long St., Columbus, Ohio; †W. A. Paine, 584 E. Broad St., Columbus, Ohio.

Connecticut—*George Herbert Gray, 42 Church St., New Haven, Conn.; †Alfred W. Boylen, 30 Whitney Ave., New Haven, Conn.

Dayton—*Howard W. Germann, Miami Savings Bldg., Dayton, Ohio; †Freeman A. Pretzinger, Reibold Bldg., Dayton, Ohio.

Detroit—*Henry F. Stanton, 2231 Park Ave., Detroit, Mich.; †Branson V. Gamber, 120 Madison Ave., Detroit, Mich.

Erie—*Fred A. Fuller 721 Commerce Bldg., Erie, Pa.; †J. Howard Hicks, Erie, Pa.

Florida Central—*J. M. Hamilton, 509 Twigg St., Tampa, Fla.; †George Winkler, 704 Telephone Bldg., Tampa, Fla.

Florida North—*Rudolph Weaver, University of Florida, Gainesville, Fla.; †W. Kenyon Drake, 21 Ocean St., Jacksonville, Fla.

Florida South—*Anthony DeH. Zink, Seybold Bldg., Miami, Fla.; †E. L. Robertson, Calumet Bldg., Miami, Fla.

Georgia—*Hal. F. Hentz, Candler Bldg., Atlanta, Ga.; †Harold Bush-Brown, Georgia Institute of Technology, Atlanta, Ga.

Grand Rapids—*Harry L. Mead, 902 Michigan Trust Bldg., Grand Rapids, Mich. †Roger Allen, 463 Houseman Bldg., Grand Rapids, Mich.

Hawaii—*Herbert Cayton, 324 S. M. Damon Bldg., Honolulu, Hawaii; †W. Mark Potter, 302 James Campbell Bldg., Honolulu, Hawaii.

*Presidents. †Secretaries.

Hy-tex

The Standard of Quality in Brick

Manufacturers and Distributors

Face Brick

Enamel Brick

Floor Tile

Salt Glaze Brick

*We invite anyone interested in
Face Brick to visit our Exhibit
Rooms to see Wall sections laid
up in all colors and textures of*

Hy-tex Brick

HYDRAULIC-PRESS BRICK COMPANY

Leading Creators of Colors and Textures in Face Brick

BUILDERS BUILDING - CHICAGO, ILL.

Indiana—*Arthur H. Bohn, 215 E. 32nd St., Indianapolis, Ind.; †Warren D. Miller, 819 Ohio St., Terre Haute, Ind.

Iowa—†Vernon F. Tinsley, Hubbell Bldg., Des Moines, Iowa.

Kansas City—*Edward W. Tanner, 6400 Ward Parkway, Kansas City, Mo.; †H. H. Dunham, 300 W. 47th St., Kansas City, Mo.

Kansas—*H. G. Overend, Fourth National Bank Bldg., Wichita, Kans.; †George M. Beal, 305 Marvin Hall, Lawrence, Kans.

Kentucky—*W. Edwin Glossop, 430 Bloom St., Louisville, Ky.; †William G. O'Toole, Louisville Trust Bldg., Louisville, Ky.

Louisiana—*Solis Seiferth, Maison Blanche Bldg., New Orleans, La.; †Mortimer Favrot, 1205 Hibernia Bank Bldg., New Orleans, La.

Madison—*Arthur Peabody, State Capitol, Madison, Wisc.; †James R. Law, First Central Bldg., Madison, Wisc.

Minnesota—*Wm. G. Dorr, 1645 Hennepin Ave., Minneapolis, Minn.; †Louis B. Bersback, 1645 Hennepin Ave., Minneapolis, Minn.

Montana—*Chandler C. Cohagen, Box 1305, Billings, Mont.; †W. R. Plew, Bozeman, Mont.

Nebraska—*J. D. Sandham, World Herald Bldg., Omaha, Nebr.; †Alan McDonald, 604 Standard Oil Bldg., Omaha, Nebr.

New Jersey—*Cornelius V. R. Bogert, 120 Main St., Hackensack, N. J.; †Clement W. Fairweather, Metuchen, N. J.

New York—*Wm. Adams Delano, 101 Park Ave., New York, N. Y.; †Julian Clarence Levi, 101 Park Ave., New York, N. Y.

North Carolina—*George R. Berryman, Box 1355, Raleigh, N. C.; †James D. Beacham, 409 Public Service Bldg., Asheville, N. C.

North Texas—*Edwin B. LaRoche, Construction Bldg., Dallas, Texas; †G. H. Thomas Washburn, 506 Southwestern Life Bldg., Dallas, Texas.

Northern California—*Harris C. Allen, 2514 Hillegass Ave., Berkeley, Cal.; †James H. Mitchell, 277 Pine St., San Francisco, Cal.

Oklahoma—*F. W. Redlich, 14 Court Arcade, Tulsa, Okla.; †A. Thomson Thorne, 322 Atco Bldg., Tulsa, Okla.

Oregon—*Jamieson Parker, U. S. National Bank Bldg., Portland, Ore.; †Fred Aandahl, Lewis Bldg., Portland, Ore.

Philadelphia—*Walter H. Thomas, 220 S. 16th St., Philadelphia, Pa.; †Victor D. Abel, 112 S. 16th St., Philadelphia, Pa.

Pittsburgh—*James M. MacQueen, Keystone Bldg., Pittsburgh, Pa.; †Lawrence Wolfe, 119 E. Montgomery Ave., N. S., Pittsburgh, Pa.

Rhode Island—*Russell H. Shaw, 10 Weybosset St., Providence, R. I.; †Albert Harkness, 31 S. Main St., Providence, R. I.

San Diego—(Names of Officers will be listed as soon as received.)

Santa Barbara—(Names of Officers will be listed as soon as received.)

Scranton—Wilkes-Barre—*Edward H. Davis, Board of Trade Bldg., Scranton, Pa.; †Lewis Hancock, 1010 Mears Bldg., Scranton, Pa.

Shreveport—*Samuel G. Wiener, Ardis Bldg., Shreveport, La.; †Edward F. Neild, Shreveport, La.

South Carolina—*Geo. E. La Faye, 1226 Sumter St., Columbia, S. C.; †Leon LeGrand, Greenville, S. C.

South Georgia—*Arthur F. Comer, 23 Abercorn St., Savannah, Ga.; †Cletus Wm. Bergen, 810 Blum Bldg., Savannah, Ga.

South Texas—*John W. Dehnert, Esperson Bldg., Houston, Texas; †Addison S. Nunn, 212 Scanlan Bldg., Houston, Texas.

Southern California—*Pierpont Davis, 3215 W. 6th St., Los Angeles, Calif.; †A. S. Nibecker 1624 Bushnell Ave., S. Pasadena, Calif.

Southern Pennsylvania—*Julian Millard, 2250 N. 3rd St., Harrisburg, Pa.; †M. Edwin Green, Third and Forster Sts., Harrisburg, Pa.

St. Louis—*Wilbur T. Trueblood, Chemical Bldg., St. Louis, Mo.; †P. John Hoener, 3605 Laclede Ave., St. Louis, Mo.

St. Paul—*Beaver Wade Day, 1212 Builders Exchange, St. Paul, Minn.; †Thomas F. Ellerbe, 692 Endicott Bldg., St. Paul, Minn.

Tennessee—*C. K. Colley, 4th and 1st Natl. Bk. Bldg., Nashville, Tenn.; †Donald W. Southgate, 1103 Nashville Trust Bldg., Nashville, Tenn.

Toledo—*Chester B. Lee, 1234 Ohio Bldg., Toledo, Ohio; †Louis U. Bruyere, Department of Architecture, Board of Education, Toledo, Ohio.

Utah—*Myrl A. McClenahan, 504 Eccles Bldg., Ogden, Utah; †Lenord C. Neilson, McIntyre Bldg., Salt Lake City, Utah.

Virginia—*Finlay F. Ferguson, Law Bldg., Norfolk, Va.; †Merrill C. Lee, Builders Exchange, Richmond, Va.

Washington, D. C.—*Horace W. Peaslee, 1228 Connecticut Ave., Washington, D. C.; †Gilbert L. Rodier, 16 Jackson Place, N. W., Washington, D. C.

Washington State—*Sherwood D. Ford, 630 Lyon Bldg., Seattle, Wash.; †J. Lister Holmes, 1030 Liggett Bldg., Seattle, Wash.

West Texas—*Ralph H. Cameron, City National Bank Bldg., San Antonio, Texas; †Harvey P. Smith, National Bank of Commerce Bldg., San Antonio, Texas.

West Virginia—*Carl Reger, Morgantown, W. Va.; Carleton C. Wood, 366 Washington Ave., Clarksburg, W. Va.

Wisconsin—*Henry C. Hengels, 445 Milwaukee St., Milwaukee, Wisc.; †Alexander C. Guth, 130 Wisconsin Ave., Milwaukee, Wisc.

*Presidents. †Secretaries.



Residence of Mrs. Alfred Granger,
Lake Forest, Illinois,
Granger & Bollenbacher, Architects.

Common Brick lends itself ideally to every type of architecture. It supplies the architect with the opportunity for artistic and individual expression in both smooth and rough masonry effects. Its texture, burned-in color and kiln marks offer occasion for conservative, moderate or striking exterior design. The prompt



and dependable delivery of common brick assures uninterrupted progress in construction.



ILLINOIS BRICK COMPANY

SUITE 1720, BUILDERS BUILDING

228 N. LaSalle Street

Chicago



Members Chicago Chapter American Institute of Architects

OFFICERS FOR 1929-1930

HOWARD L. CHEENEY, President

HUBERT BURNHAM, 2d Vice-President

CLARENCE W. FARRIER, 1st Vice-President

EUGENE H. KLABER, Treasurer

BERTRAM A. WEBER, Secretary

Directors

Two Years

JOHN C. BOLLENBACHER

RUDOLPH J. NEDVED

One Year

TIRRELL J. FERRENZ

PHILIP B. MAHER

All addresses are Chicago, Ill., except where otherwise noted.

Fellows.

Berlin, Robert C., 228 N. La Salle St.

Bennett, Edward H., 80 E. Jackson Blvd.

Dunning, N. Max, 310 S. Wabash Ave.

Fellows, Wm. K., 814 Tower Court.

Frost, Charles S., 105 S. La Salle St.

Granger, Alfred Hoyt, 333 N. Michigan Ave.

Hall, Emery Stanford, 175 W. Jackson Blvd.

Hammond, Charles Herrick, 160 N. La Salle St.

Holsman, Henry K., 307 N. Michigan Ave.

Jensen, Elmer C., 39 S. La Salle St.

Llewellyn, Joseph C., 38 S. Dearborn St.

Mundie, W. B., 39 S. La Salle St.

Nimmons, George C., 333 N. Michigan Ave.

Pashley, Alfred S., 431 S. Dearborn St. (Retired)

Perkins, Dwight H., 160 N. La Salle St.

Pond, Irving K., 180 N. Michigan Ave.

Prindeville, Chas. H., 58 E. Washington St.

Schmidt, Robert E., 104 S. Michigan Ave.

Spencer, Robert C., Jr., 602 Hester St., Stillwater, Okla.

Tallmadge, Thomas E., 160 N. La Salle St.

Wheelock, Harry B., 64 W. Randolph St.

Woltersdorf, Arthur F., 360 N. Michigan

Zimmerman, W. Carby, 212 E. Superior St. (Retired)

Institute Members.

Adler, David, 220 S. Michigan Ave.

Alschuler, Alfred S., 28 E. Jackson Blvd.

Armstrong, John A., 127 N. Dearborn St.

Baker, Cecil F., 558 Willow Rd., Winnetka, Ill.

Barry, Gerald A., 180 N. Michigan Ave.

Beersman, Chas. G., 1044 Judson Ave.

Beidler, Herbert B., 936 N. Michigan Ave.

Beman, S. S., 105 W. Monroe St.

Bentley, Harry Howe, 337 Woodland Road, Ravinia, Ill.

Bernard, L. Cosby, 830 First Trust Bldg., Hammond, Ind.

Blake, Edgar O., 634 Davis St., Evanston, Ill.

Blouke, Pierre, 80 E. Jackson Blvd.

Bohasseck, Charles, 900 N. Michigan Ave.

Bollenbacher, John C., 333 N. Michigan Ave.

Bourke, Robert E., 39 S. La Salle St.

Braun, Isadore H., 19 S. La Salle St.

Bristle, Joseph H., 160 N. La Salle St.

Burnham, Daniel Hudson, 160 N. La Salle

Burnham, Hubert, 160 N. La Salle St.

Carpenter, Frank A., 226 S. Main St., Rockford, Ill.

Carr, Charles Alban, 529 Belden Ave.

Carr, George Wallace, 333 N. Michigan Ave.

Cervin, Olaf Z., Safety Bldg., Rock Island, Ill.

Chapman, George A., 173 W. Madison St.

Chatten, Melville C., 160 N. La Salle St.

Cheney, Howard L., 80 E. Jackson Blvd.

Childs, Frank A., 720 N. Michigan Ave.

Church, Walter S., 85 9th Ave., New York, N. Y.

Clark, Edwin H., 8 E. Huron St.

Clark, William J., 902 Pine Ave., Winnetka Ill.

Coffin, Arthur S., 6 N. Michigan Ave.

Colean, Miles L., 203 N. Wabash Ave.

Cook, Norman W., 5842 Wayne Ave.

Coughlen, Gardner C., 1923 Calumet Ave.

Cowles, Knight C., 203 N. Wabash Ave.

Crosby, Wm. S., 6 N. Michigan Ave.

Crowen, Samuel N., 8 S. Michigan Ave.

Culver, Harry K., 1365 Greenleaf Ave.

Davey, John J., 431 S. Dearborn St.

Davidson, F. E., 53 W. Jackson Blvd.

Davis, Zachary T., 400 N. Michigan Ave.

Dean, Arthur R., 205 W. Wacker Drive

De Golyer, Robert S., 307 N. Michigan Ave.

DeMoney, Frank O., 30 N. La Salle St.

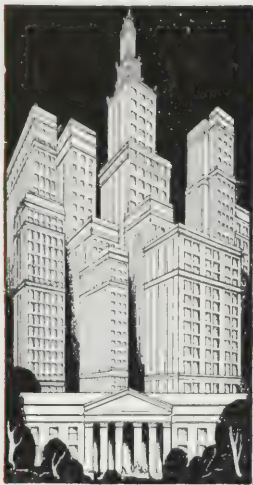
Dewey, Albert M., Jr., 332 S. Michigan Ave.

Dillard, Frank G., 205 W. Wacker Drive

Dinkelberg, Fred'k P., 160 N. La Salle St.

Dippold, Albert P., 3948 Cottage Grove Ave.

Dwen, Robert Green, 8 E. Huron St.



DDEPENDABILITY

On large construction work the time element is always of prime importance.

Over a period of sixty-three years the Moulding organization has earned a reputation for prompt delivery; for meeting and overcoming obstacles; for dependability under all conditions and for cheerful co-operation with all factors on the work.

It is for these reasons, as much as for the proven quality of the product, that the Moulding Company have been awarded the face brick contracts for many of the most important structures in the Chicago district.

THOS. MOULDING BRICK CO.

Manufacturers and Distributors of
Face Brick and Building Materials

GENERAL OFFICES AND DISPLAY ROOMS

165 W. Wacker Drive, Chicago, Ill.

Telephone—Franklin 0480

Dyer, Scott G., 38 S. Dearborn St.
 Elmslie, Geo. G., 122 S. Michigan Ave.
 Erickson, Allen E., 7 W. Madison St.
 Erickson, Carl A., 104 S. Michigan Ave.
 Fairclough, Stanley C., 809 Exchange Ave.
 Farrier, Clarence W., 160 N. La Salle St.
 Ferrenz, Tirrell J., 720 N. Michigan Ave.
 Flinn, Raymond W., 8 S. Dearborn St.
 Frazier, Walter S., 80 E. Jackson Blvd.
 Friedman, Raphael W., 28 E. Jackson Blvd.
 Frost, Harry T., 80 E. Jackson Blvd.
 Fugard, John Reed, 219 E. Superior St.
 Fuller, Ravilo F., 6 N. Michigan Ave.
 Furst, Wm. H., 127 N. Dearborn St.
 Gallup, Harold E., 646 N. Michigan Ave.
 Garden, Hugh M. G., 104 S. Michigan Ave.
 Gerhardt, Paul, Jr., 64 W. Randolph St.
 Gollnick, Louis R., 80 E. Jackson Blvd.
 Greengard, Bernhard C., 4741 Malden Ave.
 Griffin, Walter B., (out of U. S. A.)
 Grunsfeld, Ernest A., 431 N. Michigan Ave.
 Guenzel, Louis, 879 N. State St.
 Hall, Lincoln Norcott, 7 W. Madison St.
 Hallberg, Lawrence G., 116 S. Michigan
 Hamilton, John L., 814 Tower Court.
 Hammett, Ralph W., 1819 North Park Ave.
 Harding, Wal-Ward, 660 Barry Ave.
 Harris, Ralph C., 190 N. State St.
 Hatzfeld, Clarence, 7 S. Dearborn St.
 Heimbrodtt, Carl Edward, 185 Lawn Ave.,
 Western Springs, Ill.
 Helmle, George B., 1st Nat. Bank Bldg.,
 Springfield, Ill.
 Hester, John T., 2638 Fargo Ave.
 Heun, Arthur, 6 N. Michigan Ave.
 Hodgdon, Frederick, 307 N. Michigan Ave.
 Hodgdon, John M., 134 S. La Salle St.
 Holabird, John A., 333 N. Michigan Ave.
 Holmes, Morris G., 8 S. Dearborn St.
 Hooper, William T., 879 N. State St.
 Hoover, Ira Wilson, 408 S. Oxford Ave.,
 Los Angeles, Calif.
 Horn, Benjamin A., 506 Central Trust Bldg.,
 Rock Island, Ill.
 Hoskins, John M., 2837 W. Madison St.
 Hull, Denison B., 210 E. Ohio St.
 Hussander, Arthur F., 25 N. Dearborn St.
 Huszagh, Ralph D., 6 N. Michigan Ave.
 Jansson, Edward F., 740 Rush St.
 Jenkins, Harry Dodge, 620 Woodland Park
 Jensen, Clarence A., 310 S. Wabash Ave.
 Jensen, Jens J. 1105 Lawrence Ave.
 Jillson, Byron H., 222 W. Adams St.
 Johnck, Frederick, 140 S. Dearborn St.
 Keck, George F., 1453 E. 56th St.
 Kegley, Frank T., 1135 Maple Ave., Evans-
 ton
 Klaber, Eugene H., 100 W. Monroe St.
 Knox, Arthur Howard, 140 S. Dearborn St.
 Kohfeldt, Walter G., 180 N. Michigan Ave.
 Kurzon, A. Bernard, 105 W. Monroe St.
 Lagergren, Gustaf P., 7708 S. Hermitage
 Ave.
 Laist, Theo. F., Yellow Springs, Ohio.
 Lewis Le Roy, Jr., care of Albert Kahn,
 Marquette Bldg., Detroit, Mich.
 Lindeberg, George L., 30 N. LaSalle St.
 Llewellyn, Ralph C., 38 S. Dearborn St.
 Lloyd, Albert L., 180 N. Michigan Ave.
 Lovell, McDonald, 224 E. Ontario St.
 Lovell, Sidney, 224 E. Ontario St.
 Lowe, Elmo C., 636 Church St., Evanston, Ill.
 MacBride, Edward E., 5632 Blackstone Ave.
 Maher Phillip B. 157 E. Erie St.
 Manasse, De Witt J., 3023 Blaine Place
 Marshall, Benj. H., 612 Sheridan Rd., Wil-
 mette, Ill.
 Martin, Edgar, 180 N. Michigan Ave.
 Marx, Samuel A., 6 N. Michigan Ave.
 Matteson, Victor A., 8 S. Dearborn St.
 Mayo, Ernest A., 53 W. Jackson Blvd.
 McCarthy, Joseph W., 139 N. Clark St.
 McDougall, Walter A., 350 N. Clark St.
 McLaren, Robert J., 5934 Midway Park
 Meder, Everett Stanley, 601 E. 102d St.
 Meredith, David D., 222 W. Adams St.
 Merrill, John O., 333 N. Michigan Ave.
 Miller, H. Clyde, 300 W. Adams St.
 Morehouse, Merritt J., 343 S. Dearborn St.
 Morgan, Charles L., 333 N. Michigan Ave.
 Morrison, James R. M., 134 N. LaSalle St.
 Nadhernv, Joseph J., 38 S. Dearborn St.
 Nedved, Rudolph James, 814 Tower Court
 Nedved, Elizabeth Kimball, 814 Tower Court
 Nyden, John A., 196 N. State St.
 Odgers, Philip G., 5835 Nina Ave.
 Olson, Benjamin Franklin, 19 S. La Salle St.
 Oman, Samuel S., 431 N. Michigan Ave.
 Ostergren, Robert C., 155 N. Clark St.
 Parsons, Wm. E., 1800 Ry. Exchange Bldg.
 Peterson, Stanley M., 295 17th St., Wilmette,
 Ill.
 Pingrey, Roy C., 134 S. La Salle St.
 Powers, Richard, 6 N. Michigan Ave.
 Pridmore, John E. O., 38 S. La Salle St.
 Puckey, Francis W., 400 N. Michigan Ave.
 Raeder, Henry, 20 W. Jackson Blvd.
 Rebori, A. N., 332 S. Michigan Ave.
 Reed, Earl H. Jr., 431 N. Michigan Ave.
 Reiley, Solon L., 300 W. Adams St.
 Renwick, Edward A., 333 N. Michigan Ave.
 Riddle, Herbert H., 75 E. Wacker Drive
 Ritter, Louis E., 140 S. Dearborn St.

THE KALMAN FLOOR

SUPER-PROCESS
CEMENT FINISH



Kalman Floor Company
WRIGLEY BUILDING
Chicago

NEW YORK

ST. PAUL

ATLANTA

DETROIT

LOS ANGELES

Roberts, Elmer C., 82 W. Washington St.
 Robinson, Argyle E., 176 W. Adams St.
 Root, John W., 333 N. Michigan Ave.
 Saxe, Albert M., 212 E. Superior St.
 Schlacks, H. J., 820 Tower Court
 Schmid, Richard G., 180 N. Michigan Ave.
 Schmidt, Frederic B., 161 E. Erie St.
 Shattuck, Walter F., 134 N. La Salle St.
 Simpson, Percy K., 4715 Malden St.
 Small, John S., 2424 Park Place, Evanston, Ill.
 Smith, Wm. J., 720 N. Michigan Ave.
 Stanhope, Leon E., 55 E. Washington St.
 Starbuck, Fred L., 5012 Dorchester Ave.
 Steif, B. Leo, 307 N. Michigan Ave.
 Stockton, Walter T., 307 N. Michigan Ave.
 Stoetzel, Ralph E., 612 N. Michigan Ave.
 Sturm, Meyer J., 708 Church St., Evanston, Ill.
 Swern, Perry W., 228 N. La Salle St.
 Teich, Frederick J., 64 W. Randolph St.
 Tilton, John Neal, 127 N. Dearborn St.
 Tomlinson, H. Webster, 106 N. Chicago Ave., Joliet, Ill.
 Uffendell, W. Gibbons, 39 S. State St.
 Urbain, Leon F., 1254 Lake Shore Drive
 Vail, Morrison H., Detroit Mich.
 Van Bergen, John S., 234 Cedar St., Highland Park
 Venning, Frank L., 333 N. Michigan Ave.
 Viehe-Naess, Ivar, 180 N. Michigan Ave.
 Von Holst, Hermann V., 79 W. Monroe St.
 Walcott, Chester H., 435 N. Michigan Ave.
 Walcott, Russell S., 75 E. Wacker Drive
 Walker, Frank Chase, 1065 Balmoral Ave.
 Wallace, Dwight G., 22 W. Monroe St.
 Waterman, H. H., 3915 Vincennes Ave.
 Walton, Lewis B., 848 Ash St., Wilmette, Ill.
 Watson, Vernon S., 160 N. La Salle St.
 Weber, Bertram A., 343 S. Dearborn St.
 Webster, Maurice, 225 N. Michigan Ave.
 Weiss, John W., 53 W. Jackson Blvd.
 White, Chas. E., Jr., 343 S. Dearborn St.
 White, Howard J., 1417—80 E. Jackson Blvd.
 Wilkinson, Lawrence E., 16 Judson Place, Washington, D. C.
 Works, Wm. Dahney, 8129 Evans Ave.
 Wright, Clark C., 333 N. Michigan Ave.
 Wuhrmann, Wm. G., 505 Two Republics Bldg., El Paso, Texas.
 Yerkes, Wallace F., 820 Tower Court
 Youngberg, John E., 2735 Hartzell Ave. Evanston, Ill.

Chapter Members.

Graham, Ernest R., Ry. Exchange Bldg.
 Work, Robert G., 75 E. Wacker Drive

Associates.

Anderson, D. Andy, 4832 N. Irving Ave.
 Barfield, Norman D., 56 N. Lincoln St. Hinsdale, Ill.
 Cerny, Jerome R., 10 Deerpath Road, Lake Forest, Ill.
 Cerny, Otto F., 77 W. Washington St.
 Christiansen, Roy T., 360 N. Michigan Ave.
 Connors, George D., 435 N. Michigan Ave.
 Ernest, Harry Philip, 80 E. Jackson Blvd.
 Faulkner, Charles D., 307 N. Michigan Ave.
 Gerrity, James F., 2326 Farwell Ave.
 Hazen, Howard S., care of Dean & Dean, Sacramento, Calif.
 Hedrick, Leonard C., 846 Oakdale Ave.
 Holmeester, Theodore, Jr., 1229 Jarvis Ave.
 Jenkins, Russell W., 6 N. Michigan Ave.
 Lampe, C. W., 155 N. Clark St.
 Libolt, Harris Daniel, 5403 Ingleside Ave.
 Loeb, Jerry, 612 N. Michigan Ave.
 Mayo, Peter B., 53 W. Jackson Blvd.
 Mayo, Vivian B., 53 W. Jackson Blvd.
 McCaughly, W. F., 134 Clinton St., Park Ridge, Ill.
 McEldowney, Harold Batchelder, 612 Washington Ave., Glencoe, Ill.
 McGrew, Kenneth A., 1564 Sherman Ave., Evanston, Ill.
 Merrill, Edward A., 333 N. Michigan Ave.
 Minkus, Robert L., 208 W. Washington St.
 Neutra, Richard, 835 Kings Rd., Los Angeles, Calif.
 O'Connor, William J., 435 N. Michigan Ave.
 Quinn, Everett F., 360 N. Michigan Ave.
 Sailor, Homer G., 733 W. 64th St.
 Sanford, Trent E., 850 Hinman Ave., Evanston, Ill.
 Schlossman, Norman J., 612 N. Michigan Av.
 Scudder, George Marsh, 1318 Hyde Park Blvd.
 Shaw, Alfred, 201 E. Delaware Ave.
 Spitznagel, Harold Theodore, 6926 Oglesby Ave., Apt. E.
 Stanton, Frederick, 307 Michigan Ave.
 Smith, Paul H., 10 W. Elm St.
 Swanson, Robert Charles, 5404 N. Christiana Ave.
 Suter, W. Lindsay, 1220 E. 54th St.
 Taylor, Howell, Adrian, Mich.
 Wall, Richard J., 2330 N. Halsted St.
 Williams, William I., 1738 E. 84th Pl.
 Zakharoff, Alexis A., 5215 Dorchester Ave.

Honorary Members.

Donnelley, Thomas E., Green Bay Road, Lake Forest, Ill.
 Glessner, John J., 1800 Prairie Ave.
 Taft, Lorado, 6016 Ellis Ave.

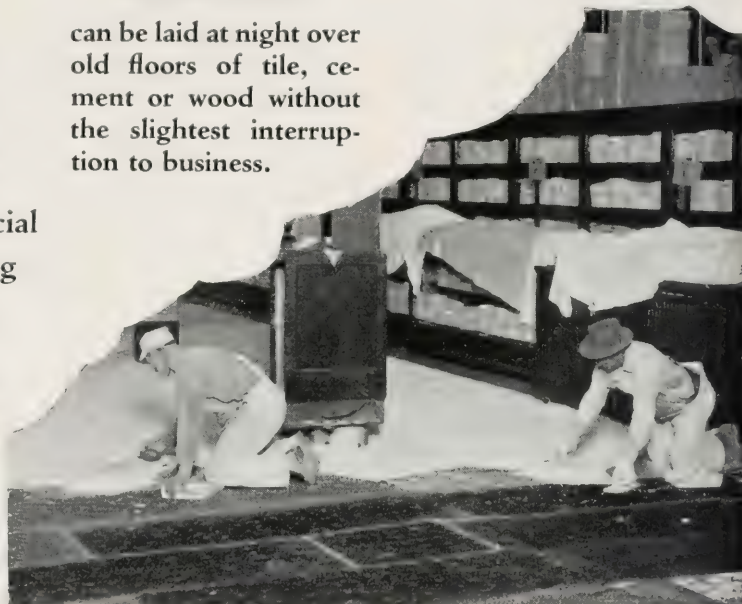
FLEXOTILE

SHEET MARBLE FLOORING

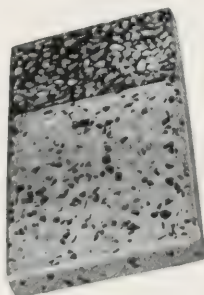
FLEXOTILE

For
Every
Type
of
Commercial
Building
Plain
or
Design

can be laid at night over
old floors of tile, ce-
ment or wood without
the slightest interrup-
tion to business.



Installed in Trowel or Terrazzo Finish



FLEXOTILE FLOORS are installed only by
skilled mechanics under a competent superintendent.

We are especially interested in that part of your
work which requires exceptionally good workman-
ship.

We specialize on remodeling as FLEXOTILE is
practical and permanent when applied over old
wooden floors.

Quick setting permits over-night installation with-
out effecting the quality of the finished floor.

Chicago Flexotile Floor Co.

1444 Conway Building

111 W. Washington St.

CHICAGO, ILL.

Phone State 3983-3984

Architctural Sketch Club

1929-1930

Officers

GERALD BRADBURY, President
EDWIN F. ANDERSON, Vice-President
T. O. MENEES, Treasurer
FRANCES M. BALDWIN, Secretary.

Massier

THOMAS J. MULIG

Directors

HOWARD BORDEWICH
V. RUND
T. H. HOFMEESTER
THOMAS J. MULIG
HAROLD T. SPITZNAGEL
WILLIAM THOMSEN

Sous-Massier

J. D. KERCHENFAUT

Active Members.

All addresses are Chicago, Ill., except where otherwise noted.

Aberle, Wilbert J., 3758 N. Kedvale Ave.
Alderman, W. N., 222 E. Ontario St.
Alschuler, Alfred S., 28 E. Jackson Blvd.
Anderson, Helmer, 1020 N. Lorel Ave.
Arneson, S. V., 1618 Orrington Ave., Evanston, Ill.
Bacci, Alex., 529 Aldine Ave.
Bailey, Hugh, 1952 Wilson Ave.
Baird, Eldon G., 156 N. Oak Park Ave., Oak Park, Ill.
Baldwin, Francis M., 424 DuBois Blvd., Congress Park, Ill.
Balfour, A. N., 1031 E. 46th St.
Bartlett, Harry O., 6928 Oglesby Ave.
Baum, M. G., 4554 Winchester Ave.
Beck, B. E., 849 Ridge Ave., Evanston, Ill.
Beck, D. W., 165 W. Wacker Drive.
Beidler, Herbert B., 7263 S. Shore Drive.
Beilin, Sidney J., 1457 Summerdale Ave.
Benn, William W., 5864 Magnolia Ave.
Berglund, E., 636 Cornelia Ave.
Bergstrom, Harold George, 5639 N. Kostner Ave.
Bieg, Harry K., R. 900 333 N. Michigan Ave.
Biegalski, Cosmio, 2314 Powell Ave.
Blomgren, Charles E., 5400 Lakewood Ave.
Bloom, Richard E., 3226 Pensacola Ave.
Blum, Richard F., 1020 N. Austin Blvd.
Blume, Louis J., 520 Cornelia Ave.
Bodinus, Wm. S., 2448 N. Harding Ave.
Bohre, Albert, 3633 Palmer St.
Booton, Joseph, 5200 Sheridan Road.
Bordewich, Howard, 4236 N. Kostner Ave.
Bradbury, G. A., R. 1634 160 N. LaSalle St.
Breckenridge, P. C., 4327 N. Paulina St.
Brout, Robert, 4937 N. Ridgeway Ave.
Brown, Arthur R., 7752 Eastlake Terrace.
Brown, Arthur T., 6109 Ellis Ave.
Buschbaum, Emanuel V., 6930 S. Shore Drive.
Burnham, Hubert, 160 N. LaSalle St.
Burrill, Loraine S., 3817 Lincoln Ave.
Busch, Earl, 528 Du Bois Blvd., Congress Park, Ill.
Carlborg, R. H., 1408 Carmen Ave.
Carlson, Elmer C., 8727 Laflin St.
Carlson, George C., 10140 St. Lawrence Ave.
Carlson, Glen, 4833 N. Kimball Ave.
Carson, Robert E., 6925 S. Peoria St.
Cauley, Frank Wm., 1619 Howard Ave.
Cerny, Jerome Robert, 10 Deerpath West, Lake Forest, Ill.

Chayes, Frank, 1334 Rosedale Ave.
Civkin, Victor, 3025 Cortland St.
Cohen, S. Bruce, 5490 Greenwood Ave.
Cohn, Irving, 3023 Cortland St.
Conley, Walter, 7427 S. Shore Drive.
Connoly, J., 6521 Greenvew Ave.
Coverley, Charles O., 7375 N. Robey St.
Crowther, Joseph C., 31 N. Ogden Ave.
Cumming, Ralph W., 3155 S. Michigan Ave.
Dennen, Thomas, 1822 S. Central Park Ave.
Eberson, Drew, 200 W. 57th St., New York, N. Y.
Edholm, W. L., 1920 Morse Ave.
Edquist, Carl B., 4433 Greenwood Ave.
Eichenbaum, Edward E., 7558 Craudon Ave.
Eiseman, Albert, Jr., 4329 N. Kostner Ave.
Ekberg, Arthur B., 2823 E. 80th St.
Emerson, Ralph Waldo, 3155 S. Michigan Ave.
Enthof, Edward W., 1639 W. 21st Place.
Eugene, Alex K., 547 Englewood Ave.
Fellows, William K., 814 Tower Court.
Fierbaugh, J. F., 341 S. Stone Ave.
Fischer, Harry L., 5873 Glenwood Ave.
Foley, Michael, 915 Sedgwick St.
Forte, Attilio, 8450 Maryland Ave.
Fosso, William R., 3155 S. Lawndale Ave.
Fuhrer, Eugene, 64 W. Randolph St.
Fowler, Harry C., 801 Dobson St., Evanston, Ill.
Frederick, G. W., 6916 Lakewood Ave.
Gaydos, Frank J., 800 Monroe St., Gary, Ind.
Gerrity, J. F., 2326 Farwell Ave.
Gilloffo, S., 2156 Stave St.
Goldman, Jos., 7405 Bennett Ave.
Gollnick, Louis R., 5347 Crystal St.
Goo, Robert, 2402 Wentworth Ave.
Gorman, Edward D., 4510 Woodlawn Ave.
Graham, Ernest R., 80 E. Jackson Blvd.
Grimmer, Vernon, 1164 N. Dearborn St.
Grimsgaard, O. H., 1056 Granville Ave.
Grosuth, Joseph, Jr., 1833 N. Washtenaw Ave.
Gross, Ralph F., 1627 S. 18th Ave., Maywood, Ill.
Grosse, Paul, 195 E. Chestnut St.
Gustafson, Virgil E., 3924 Pine Grove Ave.
Gylleck, Waldo G., 353 Summit St., Elgin, Ill.
Hahn, Stanley W., 210 E. Ohio St.
Hallin, Edward L., 5447 Kamerling Ave.
Hanebuth, Edgar C., 146 Willow Road, Elmhurst, Ill.
Hansen, Roy E., 4509 N. Racine Ave.
Hanson, Herbert C., 7956 S. Aberdeen St.
Harger, A., 1232 Maple Ave., Berwyn.



*Enduring - lustrous
rich color surfaces
cemented to the
walls in sheets*

CHROMITE

"For Walls of permanent beauty"

Colors, color combinations, borders—every desirable tiled effect in a wealth of beautiful tones! Chromite, cemented to the wall in sheets gives a permanent, lustrous, smooth, flint hard surface.

Chromite

- Baked enamel on a base of No. 5 zinc.
- Made in 16"x24" sheets of non-corrosive zinc.
- May be cemented to smooth plastered walls, plaster board or any smooth surface.
- Special putty cement is used.

Difficult arches, corners, curved surfaces and irregular edges are easily and perfectly finished with the modern wall surfacing—Chromite.

- Sheets are die cut to within 1/1000 of an inch to fit exactly and the edges are scored to make a perfect joint when placed on the wall or ceiling.
- Absolutely waterproof and non-absorbent.
- The rich colors are baked in permanently.
- The moderate price of Chromite offers a definite saving.

CHROMITE COMPANY, - 228 N. La Salle St., Chicago, Ill.

Telephone Central 9651

Made in U. S. A.

Patents Pending.

Haselburn, Robert G., 4149 N. Marmora Ave.
 Hatzfeld, Edwin, 2110 Ainslee St.
 Hawley, Elmer, 1716 N. Sawyer Ave.
 Haynes, Kenneth, 1214 N. Dearborn St.
 Heino, Albert, 8944 S. Loomis St.
 Hepner, R. H., 2434 Fargo Ave.
 Herman, Milton, 367 E. 56th St.
 Heth, Ralph, 1836 Lunt Ave.
 Heun, Arthur, 6 N. Michigan Ave., Rm. 1321.
 Highwood, Donald H., 7823 Cornell Ave.
 Hill, Dick B., 545 Woodbine Ave., Oak Park,
 Illinois
 Hinman, C. G., 5968 W. Adams St.
 Hofer, Victor G., 3645 N. Ashland Ave.
 Hofmeester, T. H., 1229 Jarvis Ave.
 Hunter, Herman, 5101 Woodlawn Ave.
 Isenberger, Robert, 7009 Hillsdale Ave.
 Isensee, Frederic M., 8201 Harper Ave.
 Jacob, V. H., 6144 S. Green St.
 Jacobson, Phillmore, 5000 Glenwood Ave.
 Jameson, Wm. S. Jr., 6930 Greenview Ave.
 Janik, Ladislav, 2827 S. Hamlin Ave.
 Jansson, Ed. F., 740 Rush St.
 Jensen, Elmer C., 39 S. La Salle St.
 Joerger, G., 5118 Warwick Ave.
 Johns, B. D., 112 Richards St., Joliet, Ill.
 Johnson, Albin, 1228 Roscoe St.
 Johnson, B. Kenneth, 5256 Cullom Ave.
 Johnson, Carl W., 1508 Hudson Ave.
 Johnson, Harold T., 5054 N. Winchester Ave.
 Kamm, Robert F., 4808 Washington Blvd.
 Kane, J. A., 1923 Calumet Ave.
 Karlin, Irving M., 7048 S. Michigan Ave.
 Kaltenbrun, James A., Indianapolis, Ind.
 Kannenberger, Werner, 272 Nuttall Road,
 Riverside, Ill.
 Kartowim, Frank, 300 Maplewood Road,
 Riverside, Ill.
 Kay, Stanley W., 11015 Parnell Ave.
 Kelly, Joe, 2319 Farragut Ave.
 Kendall, R. C., 633 Deming Place.
 Kennedy, John J., Jr., 2724 S. Keeler Ave.
 Kerchenfaut, J. D., 3503 W. Monroe St.
 Kingsley, Donald, 1158 S. Highland Ave.,
 Oak Park, Ill.
 Kinnavy, Michael, 6513 Bosworth Ave.
 Knickerbocker, E. B., 327 N. Parkside Ave.
 Knudsen, Harold N., 5363 Crystal St.
 Koenig, William, 2643 Maple Square Ave.
 Kovar, Frank, 5154 Eddy St.
 Kronich, David, 1249 N. Washtenaw Ave.
 Kronick, Gerald T., 5556 W. Jackson Blvd.
 Kurtz, David P., 5731 N. Maplewood Ave.
 Larson, Harry, 6234 S. Karlov Ave.
 Leach, Joseph P., Jr., 1205 Sherwin Ave.
 Lee Vee, Raymond N., 1468 Balmoral Ave.
 Levinson, M. B., 1434 S. St. Louis Ave.
 Levy, Albert D., 2005 N. Kedzie Ave.
 Liebert, Theodore E., 1321 Pratt Blvd.
 Lillig, M. A., 1749 N. Mayfield Ave.
 Lindeberg, George, 11 N. 4th Ave., Maywood, Ill.
 Lord, Charles Carroll, 6711 N. Washtenaw.
 Macardell, Cornelius W., c/o Div. of Archi-
 tecture, Springfield, Ill.
 MacLeish, Norman H., 608 Elm St., Win-
 netka, Ill.
 MacLellan, Albert, 881 Huntington Ave., Bos-
 ton, Mass.
 Mair, Clarke F., 327—14th St., Wilmette, Ill.
 Markowich, Joseph, 3727 Pine Grove Ave.
 Mayer, Carl G., 5635 Wood St.
 Mayo, V. B., 910 Dempster St., Evanston, Ill.
 Mazzone, Samuel, 3012 N. Kilpatrick Ave.
 McCurry, Paul D., 234 W. 60th Place.
 McGrath, Paul J., 845 Lakeside Place.
 Meiselbar, W., 1920 Ballou St.
 Menees, T. O., 1823 W. 105th St.
 Mitchell, Robert B., 3704 Maple Square Ave.
 Moonin, Harry, 1443 St. Louis Ave.
 Moravec, Bohumil T., 1920 S. 57th Ave.,
 Cicero, Ill.
 Morrison, Harry H., 6858 Merrill Ave.
 Mortinson, H. W., 2657 Ballou St.
 Mueller, Arthur, 7916 Dobson Ave.
 Mulig, Thomas J., 977 W. 18th Place.
 Muscarello, Victor, 1511 Thorndale Ave.
 Nathan, Bernard, 4830 N. Albany Ave.
 Nedved, Rudolph J., 140 S. Dearborn St.
 Nelson, Edgar, 3507 N. Springfield Ave.
 Newhouse, Henry L., Jr., 5000 Woodlawn
 Ave.
 Nicolai, A. Erwin, 1524 E. 59th St.
 Nimmons, George C., 333 N. Michigan Ave.
 Nordquist, Robert G., 839 N. Massasoit Ave.
 Nordstrand, 1011 Rush St.
 Norrgard, Werner E., 3710 Ward St.
 Oak, Clarence, 6913 Emerald Ave.
 Oborn, Charles William, 2857 Wilcox St.
 Olsen, Raymond A. W., 6054 Wellington Ave.
 Otten, Ralph H., 4545 N. Whipple St.
 Pareira, David A., 7716 Luella Ave.
 Pareira, Hal, 537 Brompton Place.
 Petersen, J. Edwin, 204 S. Humphrey Ave.,
 Oak Park, Ill.
 Peterson, Alfred, 1724 N. Troy St.
 Peterson, Karl E., Lake Forest, Ill.
 Pirola, Louis, 4717 Beacon St.
 Polacek, C., 7951 S. Elizabeth St.
 Porter, Alex G., 25 Goethe St.
 Pratt, H. D., 22 W. Monroe St., c/o Dwight
 Wallace.
 Probst, Albert John, 253 W. 110th St.
 Pyle, L. S., 19 N. Lockwood St.
 Quinn, J. Edwin, 10 S. La Salle St.
 Rabito, Guy, 5255 W. Congress St.
 Rapp, George L., 190 N. State St.
 Rauch, Paul V., 425 N. Maple Ave., Oak
 Park, Ill.
 Rehder, J. G. H., 5125 Metropole St.
 Reiner, Eugene B., 1840 Eddy St.
 Rezny, Adrian, 2202 S. Crawford Ave.
 Rieger, Morris D., 1029 N. Sacramento Blvd.
 Ritman, Howard B., 1848 S. Millard Ave.
 Roberts, N. L., Jr., c/o Holabird & Root,
 333 N. Michigan Ave.
 Rodde, Herbert L., 4442 N. Christiana St.
 Rose, Arthur, 1317 Arthur Ave.
 Ross, Torey, Jr., 2343 Geneva Terrace.
 Rund, Vaclac R., 974 W. 18th Place
 Rupinski, E. W., 2836 W. 36th St.
 Ryan, Edmond J., 4718½ Beacon St.
 Sachtleben, Albert C., 6958 S. Carpenter St.
 Sandquist, Oliver C., 5055 N. Keeler Ave.
 Sandstrom, L. E., 220 Berwyn Ave.
 Sandstrom, R. S., 1340 Winnemac Ave.
 Sargent, Norman D., 3604 Maple Square Ave.
 Schonne, C. W., 2543 Cullom Ave.
 Schwartz, Ervin, 2129 Alice Place

Nation Wide Use



1. S. S. Alaska, Alaska Steamship Co.
2. Hotel Rosslyn, Los Angeles
3. Albert Pike Masonic Temple, Little Rock, Ark.
4. Touraine Apartments, Chicago
5. Palmer House, Chicago
6. Medinah Athletic Club, Chicago
7. Pennsylvania State Capitol, Harrisburg

8. Fifth Avenue Hospital, New York
9. Standard Oil Co. Bldg., New York
10. St. George Hotel, Brooklyn
11. Mastbaum Theatre, Philadelphia
12. Bellevue-Stratford Hotel, Philadelphia
13. Chalfonte-Haddon Hall Atlantic City
14. City of Baltimore, Chesapeake Line

HARDWICK & MAGEE WILTON RUGS AND CARPETS

Imagine a great metropolis of representative buildings from the Atlantic to the Pacific . . . all handsomely furnished with Hardwick & Magee floor coverings. Could you travel down its avenues you would see Chalfonte-Haddon Hall with its 50,000 yards—the mammoth Palmer House with 110,000 yards—Brooklyn's finest, the St. George Hotel, with 50,000 yards—and so on through the imposing array of buildings.

*To specify Hardwick & Magee floor coverings
is to specify the best. Write for information.*

HARDWICK & MAGEE COMPANY

Main Office: Lehigh Ave. & Seventh St., Philadelphia

Chicago Office: 29 E. Madison Street

NEW YORK—295 Fifth Avenue
ST. LOUIS—4524 Ambassador Building
BOSTON—52 Channey Street
DETROIT—1120 Book Building

MINNEAPOLIS, MINN.—911 Plymouth Building
ATLANTA, GA.—403 Rhodes Building
LOS ANGELES—406 Spreckels Building

Schweiker, Paul, 220 S. Michigan Ave., c/o David Adler.
 Senescall, L. C., 7910 Essex Ave.
 Sevenhouse, H., 15824 Woodbridge Ave., Harvey, Ill.
 Shaver, Thomas, Deerpath Ave., Lake Forest, Ill.
 Shaw, Roger D., Locust Road, Winnetka, Ill.
 Shellenberger, Jesse E., 7005 Hilldale Ave.
 Shirinian, Sarkis, 1355 Argyle St.
 Shparago, Carl, 11 S. LaSalle St.
 Shreves, Robert, 7425 S. Shore Dr.
 Sierks, Chas. N., 2525 Clybourn Ave.
 Sir, Arthur J., 2737 Ainslie St.
 Spector, Charles S., 4035 Central Park Ave.
 Spitznagel, Harold T., 6928 Oglesby Ave.
 Stark, Chester A., 2008 Isabella St., Evanston, Ill.
 St. Clair, C. T., 7548 Saginaw St.
 Stopa, Walter, 2258 W. Walton St.
 Story, John J., 5555 Sheridan Road
 Strong, B. P., 3351 N. Springfield Ave.
 Sullivan, Andrew W., 6810 Crandon Ave.
 Summarkoff, Leonard P., 5135 Glenwood Ave.
 Sutter, J. H., 401 Fullerton Parkway.
 Svoboda, A. F., 2010 Arthur Ave.
 Sweet, John E., 5838 Wayne Ave.
 Taber, A. R., 4538 Sheridan Road.

Senior Members.

Anderson, Edwin F., 2725 Hartzell St., Evanston
 Anderson, B. D., Andy, 4832 N. Irving Ave.
 Anderson, Herbert W., 4521 N. Christiana.
 Blake, Charles G., 1000 E. 67th St.
 Baldwin, John E., 8020 Prairie Ave.
 Bently, Harry H., 337 Woodland Road, Ravinia, Ill.
 Blouke, Pierre, 80 E. Jackson Blvd.
 Bultman, W. C., 604 Hannah Ave., Forest Park, Ill.
 Crofoot, Fred, 14 N. Franklin St.
 Downton, Herbert, 118 Pine St., Elmhurst, Ill.
 Farrier, Clarence W., 4812 Lake Park Ave.
 Fox, Elmer L., 104 S. Michigan Ave.
 Goetz, M. H., 215 W. Randolph St.
 Guarino, Jochum, 155 N. Clark St.
 Hodgdon, Fred M., 307 N. Michigan Ave.
 Knezick, Wm., 4338 W. 21st Place.

Associate Members.

Archer, C. G., 1432 E. 69th St.
 Haigh, Arthur, 1003 Marquette Bldg.
 Landquist, Andrew, 1100 N. Clark St.
 Lucas, H. J., 2525 Clybourn Ave.
 Matz, Herman L., 2120 Builders Bldg., 228 N. La Salle St.

Honorary Members.

Adams, A. F., 190 N. State St.
 Allen, John K., Falmouth & St. Paul Sts., Boston, Mass.
 Blake, Theodore L., 225 Fifth Ave., New York, N. Y.
 Clark, Roberts, 2505 Kenmore Ave.
 Clow, Wm. E., Jr., Harrison & Franklin Sts. Chicago
 Dean, A. F., c/o Burnham Brothers, 160 N. LaSalle St.
 Dunning, N. Max, 310 S. Wabash Ave.
 Elcock, Edward G., 4806 Grand Blvd.
 Gates, William D., 1701 Prairie Ave.

Taylor, H. Walter, 3306 W. 67th St.
 Thompson, George D., 4506 Altgeld St.
 Thompson, Magnus, 1144 Lake Ave., Wilmette, Ill.
 Tomlinson, H. W., 333 N. Michigan Ave. c/o Holabird & Root
 Traube, George F., 4625 Greenwood Ave.
 Tyson, Arthur, 845 Washington Blvd., Oak Park, Ill.
 Van Balen, John C., 1836 S. 50th Court, Cicero, Ill.
 Van Kirk, Sidney, 2419 Leland Ave.
 Vibelius, Fred N., 909 Argyle St.
 Viscarriello, Vincent, 2941 W. Harrison St.
 Wallden, Elmer F., 4249 N. Hamlin Ave.
 Walsh, Robert A., 515 Maple Ave., Blue Island, Ill.
 Webb, Albert J., c/o H. V. Von Holtz, 79 W. Monroe St.
 Weber, Arthur M., 926 Elmwood Ave., Evanston, Ill.
 Weber, Robert F., 1312 Winona St.
 Weich, Peter, 2651 Winona St.
 Weiss, Edward W., 5469 Ingleside Ave.
 Wood, Frank Elmer, 202 N. Kenneth Ave.
 Yetter, Paul L., 5423 Kimbark Ave.
 Young, Leon N., 7122 University Ave.

Leavell, John C., 6606 University Ave.
 Lilleskau, John, 2447 Ballou St.
 Llewellyn, Ralph C., 1526 First Nat'l Bk. Bldg.
 Maynard, Henry S., Jr., 26 Park Drive, Glen View, Ill.
 McGrath, Paul C., 38 S. Dearborn St.
 Morgan, Charles L., 333 N. Michigan Ave.
 Morphet, Arch S., c/o Howard Shaw, 104 S. Michigan Ave.
 Nedved, George M., 2525 S. Turner Ave.
 Oldefest, Ed. G., 605 N. Michigan Ave.
 Schierhorn, J., 232 18th St., Wilmette, Ill.
 Sillani, Muzio, 2511 N. Clark St.
 Swensson, Walter, 448 Grant Place
 Van Dort, G. Broes, 19 W. Jackson Blvd.
 Wagner, Fritz, Jr., 384 Hawthorn Lane, Winnetka, Ill.
 Wall, R. J., 2330 N. Halsted St.

Mendius, H., Room 1611, 105 W. Monroe St.
 Moulding, Thomas, 165 W. Wacker Drive
 Snyder, D. V., 9104 S. Robey St.
 Thomsen, William F., 1945 Seminary Ave.

Hammond, C. Herrick, 160 N. LaSalle St.
 Hoepfner, E. A., Brownsville, Calif.
 Hooper, William T., 879 N. State St.
 Lowrie, Harry, Paxton Bldg., Omaha, Nebr.
 McLean, Robert C., Western Architect, Minneapolis, Minn.
 Mundie, William B., 39 S. LaSalle St.
 Parsons, William E., 80 E. Jackson Blvd.
 Pond, Irving K., 180 N. Michigan Ave.
 Puckey, Frances Willard, 400 N. Michigan Ave.
 Taft, Lorado, 6016 Ellis Ave.

The MODERN LIME

For Up-to-Date Construction

A technical product manufactured especially for mortar from pure calcium stone, washed and graded. Thoroughly calcined in a modern rotary kiln, eliminating lumps and core.

MARBLEHEAD *Quik-Slak* MASONS LIME

Slakes the instant it hits the water, takes less time and labor to do the job. Big putty yield lays extra brick—gives wonderful economy. Comes in 50 pound, full-measure, 4-ply water-proofed paper bags, easy to handle. Manufactured right in Chicago. “Quik-Slak” is being used on all kinds of buildings—preferred by Architects, Contractors and Mechanics, over other forms. Demonstration on request.

Also

WHITE LUMP LIME
“CROWN” HYDRATED LIME

MARBLEHEAD LIME CO.
160 N. La Salle St. Chicago

Phone: Central 3016

MARBLEHEAD LIME
PRODUCTS

OFFICE PRACTICE

By Illinois Society of Architects.

Believing that uniform practice in various architects' offices is desirable for all concerned, this Society recommends that the following conditions prevail in architects' offices of the State of Illinois:

Classification of Employees.

First. That employes be classed as Regular and Special;

Second. Employes classified as "Regular" will be those continually engaged for a period of not less than one year, on a weekly salary basis; it is expected that such employes will assume greater responsibilities to their employers and be granted special privileges, in consideration of faithful service;

Third. Employes classified as "Special" will be those engaged temporarily. It is deemed proper that such employes be paid by the hour for actual service rendered, making no allowance for vacations or holidays, it being considered fair under these circumstances to allow these draughtsmen a slightly higher rate per hour than regular employes who enjoy privileges of vacations and holidays.

Office Hours.

First. It is understood that draughtsmen are expected to be in their respective offices ready to begin actual work at the hours stated, and that they will continue in service at least until the hours fixed for cessation of work;

Second. The regular opening time of offices shall be 8:30 A. M., throughout the year;

Third. Period of service for Monday, Tuesday, Wednesday, Thursday and Friday, in the morning, shall be four hours, extending to 12:30 P. M., that the lunch hour shall be one hour, extending from 12:30 to 1:30 P. M.; that the afternoon period shall be four hours, extending from 1:30 to 5:30 P. M.;

Fourth. That the Saturday period of service shall consist of 4½ hours, extending from 8:30 A. M. continuously to 1:00 P. M.

Units of Service.

First. One week's service will consist of 44½ hours;

Second. One year's service will consist of 2,180½ hours.

Pay-Day.

First. That pay-day shall be on Monday of every week;

Second. That each pay-day draughtsmen be paid up to the Saturday night preceding.

Holidays and Vacations.

First. We recommend that "Regular" draughtsmen be given the following holidays on full pay: New Year's, Decoration Day, July Fourth, Labor Day, Thanksgiving Christmas;

Second. That all "Regular" draughtsmen having been in the employ of an architect for more than one year be given two weeks' vacation on full pay, at time most convenient for employer;

Third. It should be understood that "Regular" draughtsmen, quitting the employer's service of their own volition, preceding the completion of any year's service, shall not be entitled to vacation allowance;

Fourth. "Regular" employes terminating service at the request of their employer shall be entitled to an allowance in cash proportionate to two weeks' salary allowed for vacation in the same ratio as period of service bears to one year;

Fifth. Vacations and holidays are understood to be granted to employes for rest and recuperation, the employe being understood to be in the service of the employer during vacation and holiday time just to the same extent as when regularly engaged in the office;

Sixth. It is recognized that an average of 44½ hours per week's service is the maximum efficient service that can be continuously rendered without detriment to the health or efficiency of the employe, and that where the employe engages in outside architectural service of any sort for others, he does so at the expense of his employer, and his employer should be credited for corresponding loss of time. The practice of employes of one employer working nights or holidays for another is condemned as detrimental to the best interests of both employer and employe;

Seventh. In case of emergencies of short duration, "Regular" employes are expected to work over-time for the employer without extra remuneration other than a reasonable allowance for the expense of taking meals away from regular lodging place. In such cases, however, the employes will be credited with off time on account of sickness or otherwise, equivalent to the amount of over-time service rendered in cases of emergency;

Eighth. Draughtsmen are encouraged, however, to make use of a portion of their time off for educational improvement.

Illinois Society of Architects,

1015-160 N. La Salle St.

FACE BRICK

OF

Distinction and Character

—EXCLUSIVE—

Distributers of Niagara
Random Building Stone

Wisconsin Lime & Cement
Company

Main Office and Display Room
Room 421-441 Conway Building
111 W. Washington Street
CHICAGO, ILLINOIS

Telephone: FRANKLIN 1360

Illinois Society of Architects

Suite 1015, 160 N. La Salle Street, Chicago.

The following is a list of the publications of the Society; further information regarding same may be obtained from the Financial Secretary.

FORM NO. 21, "INVITATION TO BID"—Letter size, $8\frac{1}{2} \times 11$ in., two-page document, in packages of fifty at **75c**, broken packages, two for **5c**.

FORM NO. 22, "PROPOSAL"—Letter size, $8\frac{1}{2} \times 11$ in., two-page documents, in packages of fifty, at **75c**, broken packages, two for **5c**.

FORM NO. 23, "ARTICLES OF AGREEMENT"—Letter size, $8\frac{1}{2} \times 11$ in., two-page document, in packages of fifty, at **75c**, broken packages, two for **5c**.

FORM NO. 24, "BOND"—Legal size, 8×13 in., one-page document, put up in packages of twenty-five, at **25c** per package, broken packages, three for **5c**.

FORM NO. 25, "GENERAL CONDITIONS OF THE CONTRACT"—Intended to be bound at the side with the specifications, letter size, $8\frac{1}{2} \times 11$ in., ten-page document, put up in packages of fifty at **\$2.50**, broken packages, three for **25c**.

FORM 26, CONTRACT BETWEEN ARCHITECT AND OWNER. Price, **5c** each, in packages of fifty, **\$1.25**.

FORM 1, BLANK CERTIFICATE BOOKS—Carbon copy, from $3\frac{3}{4} \times 8\frac{1}{2}$ in., price, **50c**.
Two for **5c**.

FORM 4, CONTRACT BETWEEN THE OWNER AND CONTRACTOR—(Old Form.) Price, two for **5c**. Put up in packages of 50 for **\$1.00**.

FORM E, CONTRACTOR'S LONG FORM STATEMENT—As required by lien law. Price, two for **5c**.

FORM 13, CONTRACTOR'S SHORT FORM STATEMENT—Price, **1c** each.

CODES OF PRACTICE AND SCHEDULE OF CHARGES— $8\frac{1}{2} \times 11$ in. Price, five for **10c**.

These documents may be secured at the Financial Secretary's office, suite 1015, 160 N. La Salle St., telephone Cent. 4214. We have no delivery service. The prices quoted above are about the cost of production. An extra charge will be made for mailing or expressing same. Terms strictly cash, in advance, with the order; except that members of the Society may have same charged to their account.

When you specify-

INSULITE

the Wood-Fiber Insulating Board

you get *Insulation - **PLUS***

FULL ½ INCH THICK-MEANS

**12¹/₂% MORE
EFFICIENT
INSULATION**

THAN ORDINARY ¾" INSULATING BOARDS

INSULITE not only gives you *more* efficient insulation than ordinary 7/16 insulating boards . . . thereby affording *superior* protection against heat and cold . . . but it also possesses *additional values* that can be found in no other insulating material.

USED AS SHEATHING in house construction, Insulite gives a building greater structural and bracing strength than wood sheathing applied horizontally.

INSULITE PLASTER BASE grips plaster with a "clinch" that is *twice* as strong as that of wood lath, and Insulite plaster jobs are remarkably free from cracks.

INSULITE IS NOT SUBJECT TO DETERIORATION, because it is an all wood-fiber product, chemically treated. Furthermore, laboratory tests show that Insulite has much greater *tensile* strength than ordinary insulation boards.

INSULITE IS MADE TO ENDURE and it does endure as proved by more than 18 years of use in practically every type of construction, under almost every known climatic and temperature condition. No other insulation board has ever been subjected to such exacting tests, over so great a period.

INSULITE INSULATES AGAINST NOISE as well as heat and coal.

TO INSURE PROPER ACOUSTICS, Insulite Acoustile has been used in scores of theaters, churches, halls and auditoriums.

INSULITE PREVENTS MOISTURE CONDENSATION. Its value has been proved time after time, in industrial plants of every type.

YOU RECEIVE NOT ONLY BETTER, MORE EFFICIENT INSULATION when you specify Insulite, but you also get economy in building. Insulite saves you money in reduced labor costs.

LET US SEND YOU OUR BOOKS, "Specifications on the Application and Installation of Insulite," "Roof Insulation and the Prevention of Condensation of Moisture," and "Facts You Should Know About Acoustics." These books are bound in Standard A. I. A. file folders. Receiving them obligates you in no way.

THE INSULITE COMPANY

1200 Builders
Exchange,

(A Backus-Brooks Industry)

Minneapolis,
Minn.

SUGGESTIONS FOR FIRMS ISSUING CATALOGUES AND PRINTED MATTER

Architects are technically educated and are charged with selection on technical merit.

Exact and specific technical detail appeals to an architect because it enables him to judge quickly and correctly.

Drawings to scale of parts or the whole make arrangement or mechanism most quickly clear to the technically educated.

Testimonials from those technically incompetent to judge carry no weight with the competent.

Architects want authentic technical information about all building materials and devices.

Architects do not want to wade through a sea of laudatory verbiage in order to discover an islet of real usable information.

Architects must cover an immense variety and amount of detail in selecting the numerous materials that enter into a building.

Where much detail is handled by a single individual, success is dependent on system.

Information to be immediately available for architects must be classified so that each detail can be considered separately and in order.

Advertisers recognizing these principles and presenting exact technical information under proper classification, free from irrelevant matter and in convenient form for filing, so as to be available when that item is up for consideration, are most likely to secure satisfactory results from their efforts.

It is believed that most architects have their own particular system of filing and classification and would not take kindly to any advertising scheme contemplating the placing of filing cabinets in architects' offices and distribution by those interested in the promotion of advertising scheme. Architects do not take kindly to allowing outsiders access to their private catalogue filing cabinets, and it is impractical to have two filing systems in the same office.

Practical requirements in the preparation of specifications make it necessary for architects to divide their specifications into topics very similar to trade divisions brought about by divisions of labor promulgated by labor authorities, and no single division or chapter of a catalogue should contain matter pertaining to more than one trade; un-

less the material referred to is used by several trades. It is hoped that eventually the architects may agree on a satisfactory universal building material classification or index. But it is certain that this time has not yet arrived and that no person not actually having had extended experience in the preparation of architects' specifications is capable of preparing such an index that would be practical.

STANDARD SIZES Requested by Architects

Believing that uniform practice by the various publishers of catalogues and literature for distribution to architects is desirable for all concerned, and wishing to be in accord with the recommendations of the American Institute of Architects, the Illinois Society of Architects advise that all literature for this purpose be prepared to comply as nearly as possible with the conditions set forth, as follows:

First: That $8\frac{1}{2}" \times 11"$ shall be the standard sized page for all general catalogues and bulletins intended for permanent filing by architects; thus making a size convenient for filing in the standard letter-size vertical filing cabinets, such as may be procured from any concern dealing in office filing devices.

Second: That $3\frac{3}{4}" \times 8\frac{1}{2}"$ shall be the standard size for post cards and pocket editions intended for the use of architects; thus making a size convenient for filing three to the page, side by side, in standard letter-size vertical filing cabinets; or one to the page, on side, in standard vertical check files; or on end in standard legal document files; also convenient for mailing in standard legal size envelopes.

Third: That all catalogues should be issued in the form of separate bulletins, or chapters separated by a blank page, each treating of but one subject, on both sides of the same sheet, so as to make separation easy for classification purposes.

Fourth: That it is important to have pages cut to exact size; if over size in any particular they may not go into files; if under size, they may be overlooked in running through the files hastily.

Fifth: That these recommendations go into effect January 1, 1915, and that following that date, architects be advised to decline to receive literature for filing which does not comply with standard sizes.

Illinois Society of Architects
160 No. La Salle St.



THE MODERN ADVANCE IN REAL HOME COMFORT

Masonite Structural Insulation stands guard against winter cold and summer heat when used in constructing office buildings, apartments and homes. Here is an *all-wood* material that in every comparison has proved itself outstanding. Consider the fact that it was but a few years ago that Masonite Structural Insulation was comparatively unknown. Today it is the synonym of millions for perfect insulation. Certainly, this is evidence of proven worth . . . evidence that Masonite Structural Insulation is the modern advance for achieving permanent protection against heat and cold.

*A sample, together with reports made by disinterested testing engineers,
will be mailed on request.*

MASONITE CORPORATION

111 W. Washington Street, Chicago

Masonite

STRUCTURAL INSULATION • INSULATING LATH • PRESWOOD

BUILDING CONSTRUCTION EMPLOYERS' ASSOCIATION OF CHICAGO

Builders Building, 228 N. La Salle St.

HENRY ERICSSON, President

GEO. MEHRING, 1st Vice-Pres.

SUMNER SOLLITT, 2nd Vice-Pres.

E. M. CRAIG, Secretary & Business Manager.

WM. MCGUINEAS, 3rd Vice-Pres.

A. C. PREBLE, 4th Vice-Pres.

E. F. PIERCE, Treasurer

ASSOCIATIONS AFFILIATED WITH THE BUILDING CONSTRUCTION EMPLOYERS' ASSOCIATION OF CHICAGO

Builders' Association of Chicago.
Cement Contractors' Association.
Chicago Machinery Movers' Association.
Chicago Marble Dealers' Association.
Chicago Master Plumbers' Association.
Chicago Master Steam-Fitters' Association.
Chicago Mosaic & Terrazzo Dealers' Association.
Composition Floor Manufacturers' Assn.
Concrete Contractors' Association.
Decorating & Painting Contractors of Chicago.

Electrical Contractors' Association.
Illinois Fireproof and Manufacturing Contractors' Association.
Iron League of Chicago.
Lighting Fixture Employers.
Master Floor Manufacturers' Association.
Master Roofers Association of Chicago.
Plate and Window Glass Jobbers
Pipe and Boiler Covering Employers' Association.
Sheet Metal Contractors' Association.
Sprinkler Fitters' Association.

MEMBERS OF EXECUTIVE BOARD

H. N. Archibald
Vermont Marble Co.

F. C. Black
F. C. Black Co.

R. S. Blome
Blome-Sinek Co.

Geo. Clark
Farewell Cornice Co.

A. E. Coleman
Ornamental Iron

Humbert Davia
Davia Brothers

N. J. Dougherty
Schampel & Dougherty

Henry Ericsson
Henry Ericsson & Co.

A. Ferrarini
Am. Mosaic & Terrazzo Co.

B. C. Garrison
Walter G. Warren Co.

Geo. M. Getschow
Phillips Getschow Co.

H. W. Grebe
Central Asbestos & Magnesia Co.

George Griffiths
John Griffiths & Son Co.

J. J. Haines
The Haines Co.

E. Haupt
Strobel Steel Construction Co.

L. A. Hippach
Tyler & Hippach

A. H. Hottinger
Northwestern Terra Cotta Co.

L. S. Ingeman
Cent. Ornamental Iron Co.

J. M. Krafthefer
Pennoyer Merchants Transfer Co.

T. I. Magan
Thos. Conlin Co.

Wm. McGuineas
United Electrical Con. Co.

George Mehring
Mehring & Hanson Co.

T. G. Nicholson
T. C. Nicholson Co.

F. M. Novak
Novak Mosaic Co.

Benj. Olsen
Henry Newgard Co.

E. F. Pierce
C. Everett Clark Co.

J. N. Pierce
Pierce Electric Co.

W. A. Pope
Steamfitting

A. C. Preble
Harris-Preble Door Co.

Oscar A. Reum
Zander-Reum Co.

J. P. Rising
Rising Decorating Co.

O. W. Rosenthal
O. W. Rosenthal-Cornell Co.

James H. Rowley
Sykes Sheet Metal Co.

F. H. Schnepfer
Thompson-Starrett Co.

T. P. Shean
Shean Steel Window Co.

Harold F. Smith
Interstate Fireproofing Co.

Sumner Sollitt
Sumner Sollitt Co.

E. A. Thomas
Thomas Elevator Operating Co.

A. C. Warren
Hoeffer & Co.

A. E. Wells
Wells Bros. Constr. Co.

R. C. Wieboldt
R. C. Wieboldt Co.

Chas. Wolff
Wolff Brothers

EXECUTIVE COMMITTEE.

HENRY ERICSSON, Chairman

A. E. Coleman
Edward Haupt
Geo. Mehring
E. F. Pierce

R. S. Blome
A. C. Preble
Henry Ericsson
Geo. W. Griffiths

A. C. Warren
Sumner Sollitt
O. W. Rosenthal
A. E. Wells

R. C. Wieboldt
Oscar A. Reum
H. W. Grebe
Edgar S. Belden
Wm. McGuineas

Flax-li-num Insulation has proven its efficiency as a thermal insulation and sound control material over a period of 20 years. On all kinds of construction and under all conditions it has performed to the satisfaction of Architects, Contractors and owners.

The Flax-li-num Booklet, "Heat Insulation for Houses," contains full data on insulation, including complete specifications. A copy is yours for the asking.

FLAX-LI-NUM INSULATING CO.

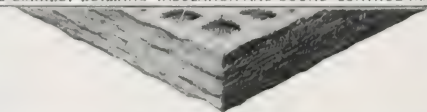
ST. PAUL, MINN.

CHICAGO OFFICE

228 North La Salle Street

Flax-li-num

THE CORRECT BUILDING INSULATION AND SOUND CONTROL MATERIAL



for SIDE WALLS

One-half inch thickness is recommended for side wall insulation. Coming in semi-rigid, flat sheets, Flax-li-num is easy to handle and install.



for CEILINGS

Full one inch thickness is recommended for ceiling and roof insulation.

THE ASSOCIATED BUILDERS OF CHICAGO

228 NORTH LA SALLE STREET

PHONE, FRANKLIN 4480

CHICAGO

Member of The Associated Contractors of Illinois

Member of The Employers' Association of Chicago

Member of Associated Employers of Illinois

OFFICERS:

JOHN FLOM*President*

FRED BULLEY.....*Vice-President*

CHARLES G. FANNING.....*Treasurer*

H. MAYNE STANTON.....*Secretary and Manager*

DIRECTORS:

WM. L. ASHBECK

H. B. BARNARD

FRED BULLEY

JOHN CHRISTENSEN

WALTER DIENER

E. D. EVANS

CHAS. G. FANNING

FRANK FLASCH

JOHN FLOM

TERKILD JENSEN

FRED KLIPPEL

WM. F. KRAHL

GERHARDT F. MEYNE

ANDREW MOWAT

R. W. RAFTIS

CARPENTERS' ARBITRATION BOARD

JOHN FLOM, *Chairman*

ERNEST A. SCHMIDT

L. A. ASHBECK

HENRY MENKE

R. F. WILSON

MASONS' ARBITRATION BOARD

JOHN FLOM, *Chairman*

E. L. ARCHIBALD

GEO. B. ARCHER

J. E. ERICSSON

JOS. NEUNKIRCHEN

CUT STONE ARBITRATION BOARD

WILLIAM Y. BROWNLIE, *Chairman*

THOS. J. ELLIS, JR.

CHAS. G. FANNING

WALTER G. DIENER

ALBERT E. WERNLE

WANTED— A HARD JOB

Cutting, Drilling Blasting

Foundations, Walls, Pavements, Rock or Concrete, by Compressed Air or Dynamite—Safely—
“Anywhere in U. S. A.”

Chicago Concrete Breaking Co.

4510 Cottage Grove Avenue
CHICAGO, ILL.

PHONE KENwood 2040

BUILDING TRADES WAGES PER HOUR IN CHICAGO

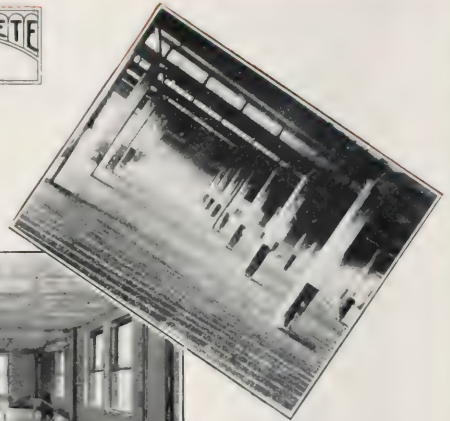
IN EFFECT NOVEMBER 1, 1929

Trade	Adopted Wage
Architectural Iron Workers	\$1.62½
Asbestos Workers	1.62½
Boilermakers	1.62½
Bricklayers	1.70
Bricklayers Fireproofers	1.70
Caisson Men (Diggers)	1.27½
Caisson Men (Windlass, Niggerhead)	1.12½
Carpenters	(\$1.25*) 1.62½
Cement Finishers	(\$1.10*) 1.62½
Composition Floor Finishers	1.62½
Composition Floor Laborers	1.03¾
Electrical Workers	(\$1.25*) 1.70
Elevator Constructors	1.62½
Elevator Constructors Helpers	1.13¾
Fixture Hangers	(\$1.25*) 1.70
Gas Fitters	(\$1.25*) 1.62½
Glaziers	(\$1.15*) 1.67½
Hoisting Engineers, Cable	(\$1.25*) 1.62½
Hoisting Engineers, Others	(\$1.00*) 1.62½
Laborers, Common	(\$0.82½*) .97½
Laborers, Plasterers	(\$0.93¼*) 1.03¾
Lathers (Five day week)	(\$1.12½*) 1.70
Machinery Riggers	1.55
Machinery Movers	1.45
Marble Setters	1.62½
Marble Setters Helpers	1.12½
Mosaic and Tile Setters	1.62½
Mosaic and Tile Setters Helpers	1.12½
Painters (Five day week)	(\$1.00*) 1.62½
Pile Drivers	1.62½
Plasterers (Five day week)	(\$1.50*) 1.70
Plumbers	(\$1.25*) 1.62½
Roofers, Composition	(\$1.20*) 1.62½
Roofers, Slate	(\$1.20*) 1.75
Sheet Metal Workers	(\$1.25*) 1.50
Sprinkler Fitters	1.62½
Sprinkler Fitters Helpers	1.00
Steam Fitters	(\$1.25*) 1.70
Stone Carvers	1.75
Stone Cutters	1.50
Stone Derrickmen	1.20
Stone Planermen	1.17½
Structural Iron Workers	1.62½
Terrazzo Mechanics	(\$1.10*) 1.56¼
Tuck Pointers	1.70

*Open Shop Rate.



Roof Fill



Sleeper Fill



Floor Fill with Cement Finish

The above pictures illustrate three uses for which Aerocrete makes an ideal material.

Freedom from corrosion, lightness in weight, permanence, and good insulation qualities for both heat and sound, are some reasons why Aerocrete is being specified on an ever-increasing number of projects.

The following are a few of the larger projects on which Aerocrete has recently been specified:

BUILDING

ARCHITECTS

Chicago Board of Trade, Chicago, Ill.....	Holabird & Root
Continental-Illinois Bank Additions, Chicago, Ill.....	Graham, Anderson, Probst & White
The Northern Trust Company Additions, Chicago, Ill.....	Frost & Henderson
LaSalle-Wacker Building, Chicago, Ill.....	Holabird & Root
Michigan Square, Chicago, Ill.....	Rebort, Wentworth, Dewey & McCormick
Illinois Bell Telephone Co. Building, Chicago, Ill.....	Holabird & Root
A. E. Staley Administration Bldg., Decatur, Ill.....	Aschauer & Waggoner
Northwestern National Bank, Minneapolis, Minn.....	Graham, Anderson, Probst & White
Midland Bank Building, Cleveland, Ohio.....	Graham, Anderson, Probst & White
Alamo Bank Building, San Antonio, Texas.....	Graham, Anderson Probst & White
Oklahoma Publishing Co., Oklahoma City, Okla.....	Frank D. Chase, Inc.
Royal Bank of Canada, Montreal, Canada.....	York & Sawyer
Chateau Laurier, Ottawa, Canada.....	John S. Archibald
Bamberger Department Store, Newark, N. J.....	Jarvis Hunt
Bell Telephone Building, Montreal, Canada.....	Barrot & Blackader
Bell Telephone Building, Newark, New Jersey.....	Vorhees, Gmelin & Walker
R. J. Reynolds Tobacco Co., Winston-Salem, N. C.....	Shreve & Lamb

Further information may be obtained by addressing:

AEROCRETE WESTERN CORPORATION

612 North Michigan Avenue

CHICAGO, ILLINOIS

Telephone Whitehall 4489

CITY HALL AND COUNTY BUILDING INFORMATION AND GUIDE

TAXES: When and Where to Pay.

GENERAL TAXES: State, County and City.

Annually at **County Treasurer's Office**, County Building, 1st floor, north end. Must be paid before May 1 of each year. Failure to pay before May 1 means a penalty of one (1%) per cent per month until sold. (Then heavier penalty; and trouble.)

SPECIAL ASSESSMENTS: (Street Paving, Water Pipes, etc.)

Payable before July 1 at City Collector's Office, City Hall, first floor, south end. Payable on and after August 1 at County Treasurer's Office, County Building, first floor, north end.

WATER TAX:

At Bureau of Water, City Hall, 1st floor, north end.

DOG TAX:

City Clerk, 1st floor, south end.

BUSINESS LICENSES:

City Collector's Office, 1st floor, south end.

OFFICES—CITY HALL.

Ambulance Service, R. 700, 1125 S. State St. Appeals, Board of (Zoning), 6th floor, R. 603, north end.

Art Commission, Municipal, R. 1012, south end.

Architect, City, 10th floor, R. 1012, south end. Billiard and Athletic Commission, 2nd floor, R. 202-A, north end.

Board of Election Commissioners, 3rd floor, R. 308, south end.

Board of Examiners:

Motor Vehicle Operators, R. 702, 1125 S. State St.
Moving Picture Operators, 6th floor, R. 614, south end.

Plumbers, 10th floor, R. 1008, south end. Stationary Engineers, 10th floor, R. 1008, south end.

Board of Inspectors of Public Vehicles, R. 702, 1125 S. State St.

Board of Local Improvements:

General Offices, 2nd floor, R. 207, south end.
Public Hearing Room, 1st floor, R. 104, north end.
Law Department, 2nd floor, R. 207, south end.

Boiler Inspection, R. 601.

Buildings, Department of, 7th floor, R. 702, north end.

Bridge Division, 4th floor, R. 402, north end. Business Agent, vault floor, north end.

City Attorney, 6th floor, R. 601, north end.

City Clerk, 1st floor, R. 107-8, south end.

City Collector, 1st floor, R. 109, south end.

City Comptroller (5th floor, north end):

General Office, R. 501.
Auditor, R. 501.
Paymaster, R. 501.
Real Estate Agent, R. 501.

City Council:

Council Chamber, 2nd floor, R. 201, north end.
General Committee Rooms, 2nd floor, R. 202, north end.
Committee on Finance, 3rd floor, R. 302, north end.
Committee on Local Transportation, 2nd floor, north end.
Committee on Gas, Oil and Electric Light, 2nd floor, north end.

City Electrician, 6th floor, R. 614, south end. City Forester, 10th floor, R. 1004, north end.

City Hall:

Engineer, basement, south end.
Chief Janitor, basement.

City Sealer, R. 608, south end.

City Treasurer, 2nd floor, center.

Civil Service Commission:

General Offices, 6th floor, R. 610, south end.

Examining Room, 10th floor, R. 1006, center.

Trial Room, R. 612.

Compensation, Dept. of, R. 302, north end.

Corporation Counsel, 5th floor, R. 511, south end.

Dog Pound, W. 29th St. and S. Sacramento Ave.

Education, Board of.

Business Manager, 650 S. Clark St.

Secretary, 650 S. Clark St.

Law Department, R. 1401, 33 N. LaSalle St.

Superintendent of Schools, 460 S. State St. Engineering, Bureau of (City Engineer), 4th floor, R. 402-4, north end.

Election Commissioners, Board of, 3rd floor, R. 308, center.

Electricity, Department of, 6th floor, R. 614, south end.

Electrical Inspection Bureau, R. 606.

Electrical Supervisor, R. 613, south end.

Fire Department:

Fire Marshal, 1st floor, R. 105, north end.

Fire Alarm Telegraph, 6th floor, R. 607, center.

Firemen's Pension Fund, Secretary of Board of Trustees (City Clerk), 1st floor, R. 107, south end.

Department Attorney, 1st floor, R. 105, south end.

Fire Prevention, Bureau of, 1st floor, R. 105, north end.

Gas & Electricity, Dept. of, R. 614, center.

Gas, Oil & Electric Light, Committee on, 2nd floor, north end.

Gas Supervisor, 6th floor, R. 613, south end.

Harbor Board, R. 406, south end.

Harbor Master, Municipal Pier.

Health, Department of, 7th floor.

Commissioner of Health, R. 710.

Bureau of Food Inspection, 704.

Bureau of Sanitary Inspection, R. 704.

Bureau of Contagious Diseases, R. 707.

Bureau of Vital Statistics, R. 707.

Complaint Division, R. 704.

Plan Examination, R. 704.

Child Welfare, R. 707.

Laboratories, R. 712.

Social Hygiene, R. 713.

House of Correction, W. 26th St. and S. California Ave.

Laboratory, Health Department, R. 712, south end.

Law, Department of:

Corporation Counsel, 5th floor, R. 511, south end.

City Attorney, 6th floor, R. 601, north end.

Prosecuting Attorney, 6th floor, R. 604, north end.

Special Assessment Attorney, 2nd floor, south end.

Library, Chicago Public, N. Michigan Ave. and E. Washington St.

Library, Municipal Reference, 10th floor, R. 1005, north end.

License Department, R. 111.

Local Transportation, Committee on, 2nd floor, north end.

Maps and Plats, Bureau of, 4th floor, R. 410, south end.

Mason Contractors, Board of Examiners of, R. 1008, south end.

Mayor's Office, 5th floor, R. 507, center.

Traffic Regulation and Public Safety, Committee on, R. 305, north end.

Morals Commission, R. 710, south end.

Motor Vehicle Operators, R. 702, Board of Examiners, 1125 S. State St.

Moving Picture Censors, R. 803, 1125 S. State St.

W-O-I PRODUCTS CO.

Not Inc.

3345 North Lincoln Street
CHICAGO

THE improved W-O-I Adjustable Side Buck Anchor offers the most satisfactory method known to architects and contractors for anchoring Wood Door Bucks to tile or gypsum partitions. Carpenters nail them to the buck when the bucks are made up and the tile setters do the rest.

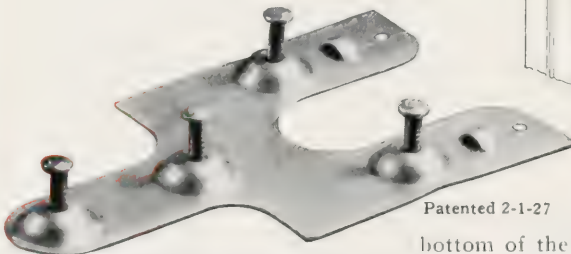
No obstructions on sides of buck to interfere with plastering.

For tying Widow Frames to brick or tile walls they have no equal.



NO DRILLING and PLUGGING

Necessary to fasten WOOD DOOR
BUCKS to Concrete Floors



View showing W-O-I Floor Buck Anchor with nails attached as one unit.

Patented 2-1-27

W-O-I CONCRETE NAILS Drive Directly into Hard Concrete

W-O-I Nails are used to fasten various kinds of metal and wooden building material to hard concrete.

THE RIGHT LENGTH W-O-I Nail to use for hard set concrete is one equal in length to thickness of material used plus $\frac{1}{2}$ inch.

CONCRETE OF LESS DENSITY than the average will take a W-O-I nail equal in length to the thickness of material used plus $\frac{5}{8}$ to $\frac{3}{4}$ of an inch.

W-O-I Nails driven into concrete on a slant are not effective—Drive W-O-I Nails straight.

W-O-I Nails are made in lengths from $\frac{1}{2}$ to 3 inches inclusive.

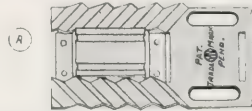
Use $\frac{1}{2}$ inch W-O-I Nails for fastening corner beads to hard concrete.

Use the $\frac{1}{2}$ inch SPECIAL W-O-I Nail for fastening carpets to concrete floors.

Use the W-O-I Magnet Punch for starting $\frac{1}{2}$ inch W-O-I Nails into concrete in connection with metal strips and corner bead erection.

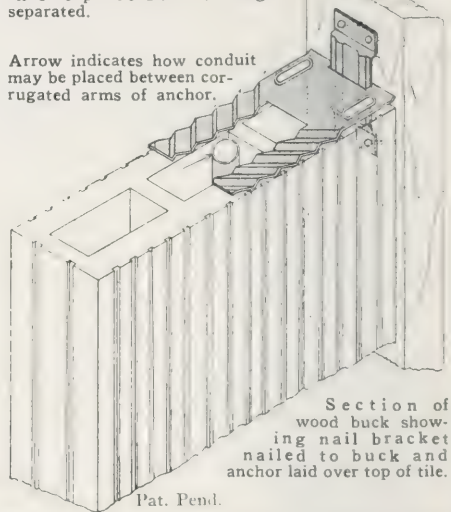
Patent No. 1660142

Illustration to the right shows nail bracket (A) nailed to buck holding anchor flat against side of buck before tile is set.



Above — Anchor and bracket in one piece before being separated.

Arrow indicates how conduit may be placed between corrugated arms of anchor.



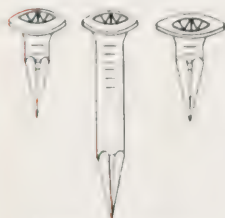
Section of wood buck showing nail bracket nailed to buck and anchor laid over top of tile.

Pat. Pend.

The use of W-O-I Floor Buck Anchors affords the best possible anchorage for your bucks.

It requires only a few seconds to set a door buck, simply nail your W-O-I Floor Buck Anchor to the

bottom of the buck and drive the W-O-I Concrete Nails, which are already attached to the anchors, directly into the hard concrete floor, and the job is done.



W-O-I
Magnet
Punch

Moving Picture Operators, Board of Examiners, 6th floor, R. 614, south end.

Municipal Art Commission, R. 1012 south end.

Municipal Court:

Chief Justice, 9th floor, R. 917, south end.

Bailiff, 8th floor, R. 804, north end.

Clerk, 8th floor, R. 814, south end.

Court Rooms, 8th, 9th and 11th floors.

Jurors Room, R. 1009.

Municipal Lodging House, 162 N. Union Ave.

Municipal Pension Fund, 3½ (vault) floor, R. 15.

Municipal Pier, foot of East Grand Ave.

Municipal Reference Library, 10th floor, R. 1005, north end.

Oils, Inspector of, 10th floor, R. 1013, south end.

Parks, Playgrounds & Bathing Beaches, Bureau of, 10th floor, R. 1004, north end.

Physician, City, 9204 Commercial Ave.

Plan Commission, Chicago, 208 W. Washington St.

Police Department:

Commissioner, 5th floor, R. 506, north end.

1st Deputy Commissioner, R. 401, 1125 S. State St.

Secretary of Police, R. 600, 1125 S. State St.

Custodian, R. 704, 1125 S. State St.

Police Pension Fund, 10th floor, R. 1002, north end.

Plumbers, Board of Examiners of, 10th floor, R. 1008, south end.

Prosecuting Attorney, 6th floor, R. 604, north end.

Public Service, Dept. of, R. 613, south end.

Public Welfare, Dept of, 139 N. Clark St.

Public Works:

Commissioner, 4th floor, R. 406, center

Bureau of Engineering, 4th floor, R. 402-4, north end.

Bridge Division, 4th floor, R. 402, north end.

Harbor Master, Municipal Pier.

Bureau of Maps and Plats, 4th floor, R. 410, south end.

Bureau of Sewers, 4th floor, R. 409, south end.

Bureau of Streets, 4th floor, R. 408, south end.

Bureau of Surveys, R. 1012.

Bureau of Water, 1st floor, R. 101-2, north end.

Water Pipe Extension Division, 4th floor, R. 404, north end.

Railway Terminal Commission, 140 N. Dearborn St.

Sanitary Inspection, Bureau of, 7th floor, R. 704, north end.

Schools, Supt. of, 460 So. State St.

Sewers, Bureau of, 4th floor, R. 409, south end.

Smoke Inspection, Department of, R. 1001, north end.

Special Assessments (Board of Local Improvements), 2nd floor, R. 207, south end.

Special Assessments (Law Department), 2nd floor, R. 207, south end.

Stationary Engineers, Board of Examiners of, 10th floor, R. 1008, south end.

Statistics, Bureau of, 10th floor, R. 1005, north end.

Steam Boilers, Steam Plants and Smoke Inspection, Department of Inspection, 6th floor, R. 601, north end.

Streets, Bureau of, 4th floor, R. 408, south end.

Supervising Engineers, Board of, 231 S. La Salle St.

Supplies, Department of (Business Agent), vault floor, north end.

Telephone Supervisor, R. 613, south end.

Track Elevation, Committee on, 3rd floor.

Traffic Regulation and Public Safety, Committee on, 10th floor, R. 305, north end.

Transportation Supervisor, R. 613, south end.

Treasurer, City, 2nd floor, center.

Tuberculosis Sanitarium, Municipal, 2049 W. Washington Blvd.

Vehicles, Board of Inspectors of, 1125 S. State St.

Waste Disposal, Bureau of, W. Pershing Road and Iron St.

Water, Bureau of, 1st floor, R. 101-2, north end.

Water Pipe Extension Division, 4th floor, R. 404, north end.

Weights and Measures, Department of, 6th floor, R. 608, south end.

OFFICES—COUNTY BUILDING.

APPELLATE COURT, CLERK OF:

Wm. Walter Scott.

R. 1908. 30 N. Michigan Blvd.

BOARD OF ASSESSORS:

Members of the Board:

Charles Ringer.

John E. Conroy,

Adam Wolf,

Charles Krutckoff.

Gene G. Oliver,

Chief Clerk:

Charles Keffler,

R. 312, 3rd floor.

BOARD OF REVIEW:

Members of Board:

Edward R. Litsinger,

Wm. H. Weber,

Charles V. Barrett.

Chief Clerk:

Meyer Cossman.

R. 337, 3rd floor.

CIRCUIT COURT:

Clerk:

Thomas O. Wallace.

R. 412, 4th floor.

Judges:

Hon. Mary M. Bartelme,

Hon. John R. Caverly,

Hon. David M. Brothers,

Hon. Wm. V. Brothers,

Hon. Harry M. Fisher,

Hon. Hugo M. Friend,

Hon. Michael Feinberg,

Hon. Otto Kerner,

Hon. Thomas J. Lynch,

Hon. David F. Matchett,

Hon. George Fred Rush,

Hon. Ira Ryner,

Hon. Kickham Scanlan,

Hon. Philip L. Sullivan,

Hon. Thomas Taylor, Jr.,

Hon. Stanley Klarkowski,

Hon. D. J. Normoyle,

Hon. Francis S. Wilson.

CIVIL SERVICE COMMISSION:

Jas. C. Denvir.

George T. Moxley.

Erwin J. Hasten, Sec'y.

R. 512, 5th floor.

CLERK, COUNTY:

Robert M. Sweitzer.

R. 237, 2nd floor.

COMPTROLLER, DEPUTY COUNTY:

William J. Graham.

R. 511, 5th floor.

CORONER:

Herman N. Bundesen,

R. 500, 5th floor.

COUNTY CLERK:

Robert M. Sweitzer.

R. 237, 2nd floor.

The No. 3 "Tie-To" Metal Lath Hanger

FOR CONCRETE CONSTRUCTION

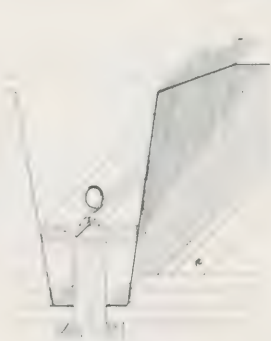
- THAT—**
1. *Saves 16 to 25c per Sq. Yd. of metal lath hung.*
 2. *Is adaptable to any type of form work.*
 3. *Requires no mutilation of form work.*
 4. *Is "fool proof" which assures a perfect installation.*
 5. *Requires no further preparation after forms are removed.*
 6. *Speeds up construction.*

THESE, and many lesser, but nevertheless significant advantages, combine to make the "TIE-TO" Insert method, the most economical, practical, and adaptable of metal lath installations. It becomes **STANDARD** for the architect who has seen it installed in one of his projects.

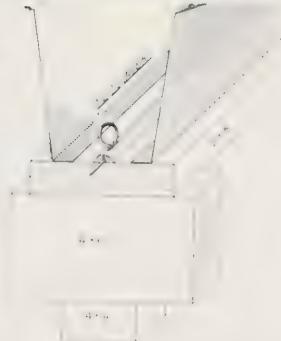
Illustrations below, and center below, show two commonly used types of framing, for a No. 3 Insert installation shown in joist to the right.



Illustration below shows "TIE-TO" method of framing for a No. 1. Insert installation which is shown in joist to the immediate left.



D & R SYSTEM



COMMON TYPE



"TIE-TO" METHOD

The No. 3 "TIE-TO" Metal Lath Hanger is a unit comprised of the No. 1 "TIE-TO" Insert and the "TIE-TO" Core Strip. The No. 1 Insert is used alone, only when installed according to the "TIE-TO" Method of Framing shown at right above. The No. 3 Inserts come packed 250 lbs. ft. per carton in five feet lengths, and are nailed to the soffit piece to form a continuous Insert the entire length of the joist. After the form work is removed (the core strip comes out with the form) there remains in the concrete, an indentation in the center of which is a continuous anchor, parallel to, and even with the bottom of the joist. To this support, metal lath is tied, easily and swiftly, **ALWAYS AT THE RIB POINTS.**

Write for Further Information, Samples, Etc.

"TIE-TO" INSERT COMPANY

874 LAYTON BOULEVARD

MILWAUKEE, WIS.

COUNTY COMMISSIONERS, BOARD OF:

Anton J. Cermak, President.

Commissioners, City Districts:

Francis L. Boutell,
Frank J. Wilson,
Emmett Whealan,
John W. Gibson,
Anton J. Cermak,
Maurice Kavanagh,
Andrew C. Metzger,
Louis Nettlehorst,
Charles S. Peterson.
Harry A. Newby.

Country Districts:

William Busse,
Joseph P. Carolan,
John W. Jaranowski,
Oscar W. Schmidt,
Frank J. Kriz.

Committee Clerk:

Barth P. Collins.
R. 537.

COUNTY COURT:

Edmund K. Jarecki, Judge.
R. 603, 6th floor.
Robert M. Sweitzer, Clerk.
R. 600, 6th floor.

COUNTY EMPLOYEES PENSION FUND:

R. 512.

COUNTY HOSPITAL:

Michael Zimmer, Warden.
Harrison and Wood Sts.

COUNTY SUPERINTENDENT OF SCHOOLS:

Edward J. Tobin.
R. 1122, 11th floor.

COUNTY TREASURER:

George F. Harding.
Office. R. 212, 2nd floor.
General Office, 1st floor, north end.

CUSTODIAN, COUNTY BUILDING:

James P. Cavanaugh.
R. 1026, 10th floor.

FOREST PRESERVE COMMISSIONERS, BOARD OF:

R. 547, 5th floor.

HIGHWAYS, SUPERINTENDENT OF:

Geo. A. Quinlan,
139 N. Clark St.

JURY COMMISSIONERS:

Joseph H. Barnett.
Thomas P. Keane.
Jas. J. McVicker.
Martin Peterson, Clerk.
R. 824, 8th floor.

JUVENILE COURT:

Hon. Mary M. Bartelme, Judge.
Roosevelt Rd. and Ogden Ave.

LAW LIBRARY:

R. 1025.

MARRIAGE COURT:

R. 226.

MORGUE, COUNTY:

Harrison and Wood Sts.

OAK FOREST INFIRMARY:

Frank Venecsek, Superintendent.
Oak Forest, Illinois.

PROBATE COURT:

Hon. Henry Horner, Judge.
R. 643, 6th floor.
Mitchell C. Robin, Clerk.
R. 623, 6th floor.

PUBLIC GUARDIAN:

Bridget H. Sullivan.
R. 908.

BUREAU OF PUBLIC WELFARE:

Joseph L. Moss, Director,
1130 County Bldg.
Field Service Division,
1908 W. Polk St.
Institutional Service Division,
1908 W. Polk St.
Court Service Division,
1130 County Bldg.
Mrs. Margaret Donar, Supervisor.

RECORDER OF DEEDS:

Clayton F. Smith,
1st floor, south end

REGISTRAR OF TITLES (Torrens System):

Clayton F. Smith,
R. 1010, 10th floor.

REVIEW, BOARD OF:

R. 337, 3rd floor.

RURAL PUBLIC HEALTH NURSES OF COOK COUNTY:

R. 922.

SHERIFF:

John E. Traeger,
R. 423, 4th floor.

STATE'S ATTORNEY:

John A. Swanson,
Criminal Court building, 26th St. and
California Ave.
Cook County Law Department.
R. 507, 5th floor.

SUPERIOR COURT:**Judges:**

Hon. Albert C. Barnes,
Hon. Wells M. Cook,
Hon. Worth E. Caylor,
Hon. Joseph B. David,
Hon. Emanuel Eller,
Hon. Joseph H. Fitch,
Hon. Charles M. Foell,
Hon. William N. Gemmill,
Hon. Martin M. Gridley,
Hon. Oscar Hebel,
Hon. Jacob H. Hopkins,
Hon. Frank D. Comerford,
Hon. Jesse Holdom,
Hon. Marcus Kavanagh,
Hon. Harry A. Lewis,
Hon. William J. Lindsay,
Hon. John P. McGoorty,
Hon. Michael L. McKinley,
Hon. William H. McSurely,
Hon. Harry B. Miller,
Hon. John M. O'Connor,
Hon. Hugo Pam,
Hon. Joseph Sabath,
Hon. Walter P. Steffen,
Hon. Denis E. Sullivan,
Hon. John J. Sullivan,
Hon. Robert E. Gentzel,
Hon. Charles A. Williams.

Clerk:

M. S. Szymczak,
R. 437, 4th floor.

SUPERINTENDENT OF PUBLIC SERVICE:

Henry A. Zender,
R. 519, 5th floor.

SURVEYOR:

William Kramer,
R. 726, 7th floor.

TAX EXTENSION DEPARTMENT:

Joseph Ziemba, Chief.
R. 217, 2nd floor.

TORRENS SYSTEM:

Clayton F. Smith, Registrar,
1st floor, south end.

COUNTY ARCHITECT:

Eric E. Hall.
R. 2100, 123 W. Madison St.

CLERK OF CRIMINAL COURT:

John H. Passmore,
Criminal Court building, 26th St. and
California Ave.

PLASTIC PRODUCTS



CAST STONE ORNAMENTAL PLASTER

CAST STONE

ARCHITECTURAL
BUILDING TRIM



GARDEN FURNITURE



FOUNTAINS



MANTELS



CATALOGUE UPON
REQUEST

PLASTER

STAFF and RELIEF
PRECAST and RUNWORK



MANTELS



PERIOD ORNAMENTA-
TION FROM STOCK
OR SPECIAL DESIGNS



COMPO for WOODWORK

CONTRACTORS and MANUFACTURERS

PLASTIC PRODUCTS COMPANY

1991 Port Washington Road

Milwaukee, Wis.

CITY OFFICIALS

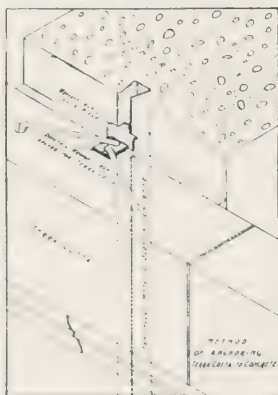
WM. HALE THOMPSON.....	Mayor.
JOHN M. KELLY.....	Secretary to the Mayor.
HUGH NORRIS.....	Oil Inspector.
DANIEL A. SERRITELLA.....	City Sealer.
GEORGE K. SCHMIDT.....	City Comptroller.
VICTOR S. PETTERSON.....	Deputy City Comptroller.
RICHARD W. WOLFE.....	Commissioner of Public Works.
CHARLES S. PETERSON.....	City Treasurer.
PATRICK SHERIDAN SMITH.....	City Clerk.
EDWARD J. PADDEN.....	Chief Clerk, City Clerk's Office.
J. WYATT MCGAFFEY.....	Reading Clerk, City Council.
MICHAEL J. KENNEDY.....	City Eleterician.
WM. M. GARRISON.....	Department of Supplies.
MORRIS ELLER.....	City Collector.
GEORGE F. LOHMAN.....	Deputy City Collector.
DR. ARNOLD H. KEGEL.....	Commissioner of Health.
DR. GOTTFRIED KOEHLER.....	Assistant Commissioner of Health.
DR. HUGH O. JONES.....	Assistant Commissioner of Health.
DR. A. S. POPE.....	Chief Medical Inspector:
JOSEPH J. BUTLER.....	Superintendent of Streets.
CARLOS AMES, President.....	} Civil Service Commission.
ARCHIBALD J. CAREY.....	
EDWARD J. DENEMARK.....	
JAMES S. OSBORNE.....	Secretary, Civil Service Commission.
CHRISTIAN P. PASCHEN.....	Building Commissioner.
ROBERT KNIGHT.....	Chief Deputy Building Commissioner.
WILLIAM F. RUSSELL.....	Commissioner of Police.
JOHN H. ALCOCK.....	First Deputy Commissioner of Police.
MARTIN E. MULLEN.....	Deputy Commissioner of Police.
JOHN L. HOGAN.....	Deputy Commissioner of Police.
THOMAS W. WOLFE.....	Deputy Commissioner of Police.
JOHN STEGE.....	Deputy Commissioner of Police.
IRA J. McDOWELL.....	Deputy Commissioner of Police.
JAMES L. MOONEY.....	Deputy Commissioner of Police.
JOHN A. EGAN.....	Chief, Detective Bureau.
PHILIP R. CRIPPEN.....	Secretary of Police.
SAMUEL A. ETTTELSON.....	Corporation Counsel.
WM. D. SALTIEL.....	City Attorney.
FRANK PESKA.....	City Prosecutor.
JOHN D. RILEY.....	Map Department.
DR. JOHN F. BESELER.....	City Physician.
ARTHUR J. DEVEREUX.....	Superintendent, Bureau of Water.
W. J. BALMER.....	Comr. of Public Service.
GEORGE D. KING.....	} Board of Examining Engineers.
EDWARD B. BANNER, President.....	
EARLE A. BUSCH.....	
GEO. E. NYE.....	Inspector of Steam Boilers, Steam Plants and Smoke Inspection.
N. E. MURRAY.....	Superintendent of Sidewalks.
LORAN D. GAYTON.....	City Engineer.
MICHAEL J. FAHERTY (President).....	} Board of Local Improvements.
WM. S. FINUCANE.....	
ELMER A. BROWN.....	
JAMES VIGNOLA.....	} Secretary of Board of Local Improvements.
JOSEPH F. McCLOREY.....	
M. J. CORRIGAN.....	Fire Marshal.
A. W. GOODRICH.....	Fire Commissioner.
GEO. E. McGRATH.....	Supt. of Sewers.
FREDERICK REX.....	Municipal Librarian.
JOHN A. PELKA, Commissioner.....	Dept. of Compensation.
JAMES CURRAN.....	Supt. House of Correction.
PAUL GERHARDT, JR.....	City Architect.
ANNA L. SMITH.....	Supt. of Public Welfare.
FRANK A. CHAMBERS.....	Deputy Smoke Inspector in Charge.
J. LLOYD WALSH (Master).....	} Board of Examining Plumbers.
JULIUS NEWMAN (Journeymen).....	
WM. P. CROWE (Chairman).....	} Board of Examining Mason Contractors.
WALTER C. PETERSON (Member).....	

The Dovetail Anchor Slot

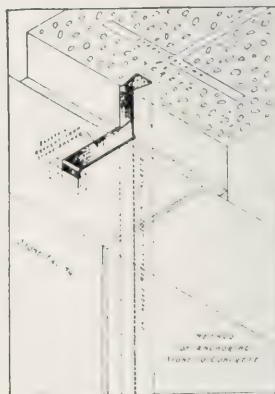
For Anchoring

Brickwork Terra Cotta Masonry
To Concrete

The only system that eliminates old fashioned hit or miss methods of anchoring. Permits the contractor to work with speed and assurance, cutting down his labor costs. The architect will know that the brick, stone or terra cotta veneer is anchored—and securely.

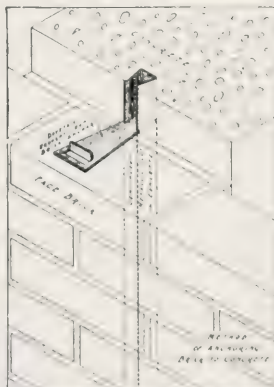


Terra Cotta Anchor



Masonry Anchor

The slot is made of 22 gauge galvanized metal, furnished in ten foot lengths. This is easily nailed to the forms before concrete is poured. After forms are removed a continuous metal lined slot remains embedded in the concrete. The proper anchor (see illustration) can be inserted at any desired height.



Brick Anchor

From coast to coast, the most prominent buildings, large and small, stand as evidence of the opinion architects have of this system. Simple and practical, it satisfies every architectural requirement. Our new descriptive folder is now ready. You should have a copy for your file.

THE DOVETAIL ANCHOR SLOT CO.

1905 BUILDERS BUILDING
CHICAGO, ILL.

Phone Franklin 4436

THE CITY COUNCIL, CHICAGO

HONORABLE WILLIAM HALE THOMPSON, Mayor

PATRICK SHERIDAN SMITH, City Clerk

EDWARD J. PADDEN, Chief Clerk

1ST WARD	JOHN B. COUGHLIN, 118-120 N. La Salle St.....	Dearborn 0655
2ND WARD	L. B. ANDERSON, 3347 S. Michigan Ave.....	Douglas 6480
3RD WARD	ROBERT R. JACKSON, 611, 3743 S. State St.....	Boulevard 2528
4TH WARD	B. A. CRONSON, 621, 77 W. Washington St.....	Central 4151
5TH WARD	CHARLES S. EATON, 1128, 7 S. Dearborn St.....	State 5811
6TH WARD	GUY GUERNSEY, 1515, 111 W. Monroe St.....	Randolph 0901
7TH WARD	CLEMENT A. NANCE, 1960 E. 71st St.....	Fairfax 7720
8TH WARD	WM. D. MEYERING, 736 E. 83rd St.....	Triangle 7026
9TH WARD	SHELDON W. GOVIER, 11054 Cottage Grove Ave.....	Pullman 8527
10TH WARD	WM. A. ROWAN, 3022 E. 92nd St.....	Regent 0128
11TH WARD	JOHN P. WILSON, 2920 Lowe Ave.....	Michigan 1770
12TH WARD	B. J. ZINTAK, 3663 S. Paulina St.....	Lafayette 1218
13TH WARD	JOS. B. McDONOUGH, 551 W. 37th St.....	Boulevard 6949
14TH WARD	WM. R. O'TOOLE, 1102 W. 55th St.....	Boulevard 0180
15TH WARD	THOMAS F. BYRNE, 6217 S. Washtenaw Ave.....	Prospect 1259
16TH WARD	TERENCE F. MORAN, 5641 Loomis Blvd.....	Englewood 6593
17TH WARD	JAMES G. COYLE, 6640 Stewart Ave.....	Englewood 7972
18TH WARD	WALTER W. MORRIS, 6417 S. Halsted St.....	Wentworth 8041
19TH WARD	O. E. NORTHRUP, 559 W. 81st St.....	Stewart 0810
20TH WARD	WILLIAM V. PACELLI, 771 De Koven St.....	Haymarket 5586
21ST WARD	DENNIS A. HORAN, 2325 Marshall Blvd.....	Rockwell 8712
22ND WARD	JOSEPH CEPAK, 3250 W. 26th St.....	Crawford 2103
23RD WARD	JOHN TOMAN, 4056 W. 21st Pl.....	Lawndale 5169
24TH WARD	JACOB M. ARVEY, 11 S. La Salle St.....	Central 9760
25TH WARD.	JAMES B. BOWLER, 1311 S. California Ave.....	Crawford 1345
26TH WARD	FRANK A. SLOAN, 1223 W. Roosevelt Rd.....	Canal 4969
27TH WARD	VACANT.	
28TH WARD	GEO. M. MAYPOLE, 905, 139 N. Clark St.....	Randolph 8000, Ext. 48
29TH WARD	ALBERT J. HORAN, 307 S. Kedzie Ave.....	Van Buren 2000
30TH WARD	JOHN S. CLARK, 215 S. Cicero Ave.....	Columbus 2608
31ST WARD	FRANK E. KONKOWSKI, 1030 W. Chicago Ave.....	Monroe 4614
32ND WARD	JOS. HIGGINS SMITH, 2305 W. Superior St.....	Brunswick 7735
33RD WARD	G. M. ROZCZYNSKI, 1952 Evergreen Ave.....	Humboldt 9358
34TH WARD	EDWARD J. KAINDL, 2331 Rice St.....	Humboldt 5684
35TH WARD	GEORGE SEIF, 211, 2750 W. North Ave.....	Humboldt 6010
36TH WARD	EUGENE L. NUSSER, 2100 N. Avers Ave.....	Albany 4358
37TH WARD	JAMES H. TAYLOR, 446 Pine Ave.....	Austin 0003
38TH WARD	FRANK H. LANDMESSER, 2531 N. Artesian Ave.....	Humboldt 8967
39TH WARD	FRANK R. RINGA, 3701 Belmont Ave.....	Keystone 9730
40TH WARD	JOSEPH C. ROSS, 3225 Lawrence Ave.....	Juniper 0147
41ST WARD	THOS. J. BOWLER, 6101 Warwick Ave.....	Kildare 3309
42ND WARD	D. R. CROWE, Com. Rm. A, City Hall.....	Randolph 8000, Ext. 40
43RD WARD	ARTHUR F. ALBERT, 902, 77 W. Washington St.....	Franklin 3396
44TH WARD	ALBERT E. LOESCHER, 1217 Webster Ave.....	Lincoln 7696
45TH WARD	WM. H. FEIGENBUTZ, 3234 Southport Ave.....	Buckingham 7723
46TH WARD	O. F. NELSON, 1233, 160 N. La Salle St.....	Dearborn 4032
47TH WARD	JOHN J. HOELLEN, 1938 Irving Park Blvd.....	Graceland 1878
48TH WARD	JOHN A. MASSEN, 230 S. Clark St.....	Dearborn 9724
49TH WARD	E. I. FRANKHAUSER (Elected Superior Court Judge).	
50TH WARD	CURTIS F. MELLIN, 2337 Devon Ave.....	Hollycourt 3902

WILLIAM F. HARRAH, Sergeant-at-Arms.

ALBERT T. JOHNSON, Assistant Sergeant-at-Arms.

JOHN FAHEY, Assistant Sergeant-at-Arms.

JOHN J. DOHNEY, Assistant Sergeant-at-Arms.

Elevator Entrances by Dahlstrom



Architect
Benjamin H. Marshall
612 Sheridan Road, Wilmette, Ill.

Drake Tower, Chicago, Ill.

Contractor
Benjamin H. Marshall Construction Co.
200 East Walton Place, Chicago, Ill.

DAHLSTROM METALLIC DOOR COMPANY JAMESTOWN, N. Y.

Established 1904

NEW YORK, 375 Fifth Avenue

CHICAGO, 19 South La Salle Street

DETROIT, 1331 Dime Bank Building

"No building is more fireproof than its doors"—Dahlstrom

WALTER L. EDWARDS, Dist. Mgr.

Artistic

Durable



Sanitary

Fireproof

MEMBERSHIP OF COUNCIL COMMITTEES

1929-1931

Finance. Meets on Tuesdays at 2:00 P. M.—CLARK (Chairman), Anderson, Cronson, Guernsey, Govier, McDonough, O'Toole, Byrne, Moran, D. A. Horan, Arvey, J. B. Bowler, Maypole, Smith, Seif, Kaindl, Crowe, Nelson.

Local Transportation. Meets on Fridays at 2:00 P. M.—McDONOUGH (Chairman), Jackson, Cronson, Guernsey, Meyering, Rowan, Wilson, O'Toole, Byrne, Moran, Cepak, Toman, Arvey, J. B. Bowler, Smith, Seif, T. J. Bowler, Nelson, Hoellen.

Gas Oil and Electric Light. Meets on Fridays at 11:00 A. M.—ARVEY (Chairman), Jackson, Cronson, Meyering, Wilson, McDonough, O'Toole, Moran, Coyle, Cepak, Toman, A. J. Horan, Seif, Nusser, Ringa, Loescher, Feigenbutz, Nelson, Hoellen.

Judiciary and Special Assessments. Meets on Thursdays at 10:30 A. M.—NELSON (Chairman), Coughlin, Jackson, Cronson, Govier, Wilson, McDonough, Northrup, Toman, Arvey, J. B. Bowler, Maypole, A. J. Horan, Konkowski, Seif, Taylor, Ross, Feigenbutz, Massen.

Efficiency, Economy and Rehabilitation. Meets on Thursdays at 2:00 P. M.—VACANT (Chairman), Guernsey, Nance, Rowan, Morris, Pacelli, D. A. Horan, Maypole, A. J. Horan, Konkowski, Smith, Rozczynialski, Nusser, Taylor, Hoellen, Massen.

Local Industries, Streets and Alleys. Meets on Tuesday at 10:30 A. M.—D. A. HORAN (Chairman), Coughlin, Anderson, Wilson, O'Toole, Byrne, Moran, Coyle, Pacelli, Toman, J. B. Bowler, Sloan, Kaindl, Seif, Nusser, Ringa, Loescher, Feigenbutz, Mellin.

Railway Terminals. Meets on Mondays at 2:00 P. M.—KAINDL (Chairman), Anderson, Jackson, Cronson, Eaton, Guernsey, Nance, Meyering, Northrup, Cepak, Toman, Maypole, Rozczynialski, Seif, Nusser, Albert, Loescher, Nelson, Hoellen, Massen.

Buildings and Zoning. Meets on Mondays at 10:30 A. M.—O'TOOLE (Chairman), Coughlin, Jackson, Govier, Rowan, Wilson, Zintak, Coyle, Morris, Northrup, Pacelli, Cepak, A. J. Horan, Smith, Nusser, Ringa, Ross, T. J. Bowler, Crowe, Nelson, Mellin.

Harbors Wharves and Bridges. Meets subject to call of Chairman.—GUERNSEY (Chairman), Coughlin, Nance, Meyering, Govier, Rowan, Zintak, Coyle, Morris, Northrup, Pacelli, Maypole, Smith, Ringa, Crowe, Albert.

Track Elevation. Meets on Fridays at 10:00 A. M.—A. J. HORAN (Chairman), Coughlin, Anderson, Eaton, Nance, Govier, Rowan, Wilson, McDonough, Moran, Coyle, Northrup, Sloan, Maypole, Konkowski, Nusser, Taylor, Ringa, Crowe, Massen.

Schools, Fire and Civil Service. Meets subject to call of Chairman.—HOELLEN (Chairman), Anderson, Govier, Zintak, Northrup, D. A. Horan, Toman, Sloan, Konkowski, Taylor, Ross, T. J. Bowler, Crowe, Albert, Feigenbutz, Mellin.

Traffic Regulation and Public Safety. Meets on Thursdays at 2:30 P. M.—T. J. BOWLER (Chairman), Coughlin, Eaton, Nance, Zintak, McDonough, Coyle, Morris, Cepak Maypole, A. J. Horan, Konkowski, Rozczynialski, Kaindl, Albert, Loescher, Feigenbutz, Hoellen, Massen.

Public Health. Meets subject to call of Chairman.—MORAN (Chairman), Eaton, Nance, Meyering, Zintak, Morris, Pacelli, Sloan, Rozczynialski, Taylor, Ringa, Ross, Albert, Massen, Mellin.

Police and Municipal Institutions. Meets subject to call of Chairman.—BYRNE (Chairman), Anderson, Jackson, Cronson, Govier, Morris, Pacelli, Cepak, Toman, J. B. Bowler, Konkowski, Rozczynialski, Taylor, Ross, T. J. Bowler, Loescher, Feigenbutz, Mellin.

Farks, Playgrounds, Aviation and Athletics. Meets subject to call of Chairman.—CROWE (Chairman), Eaton, Meyering, Rowan, Zintak, Byrne, D. A. Horan, Sloan, A. J. Horan, Rozczynialski, Kaindl, Ross, T. J. Bowler, Albert, Loescher, Mellin.

Conventions. MAYPOLE (Chairman), Morris, Clark, Kaindl, Crowe.

Committees and Rules. Meets subject to call of Chairman.—McDONOUGH (Chairman), (alternate, O'TOOLE), Cronson (alternate, Coughlin), Clark (alternate, A. J. Horan), (alternate, Seif), Nelson (alternate).



THE ESTABLISHED policy of the Otis Elevator Company is to co-operate in every way with Architects. For elevator problems of a special nature, the Engineering Organization of the Company is available to the Architect.

75 years of Elevator practice enables it to provide statistical and other data of value in a study of any particular Elevator problem, whether this involves merely a hand elevator installation, or one for the largest or tallest building. Remodeling existing installations presents opportunities for the application of this practical knowledge, and it is able to offer suggestions often leading to economies.

Practical experience has standardized certain equipments, making available the best proportioned unit for any particular business or building—usually at a saving in rental space and money. Layouts and other data pertinent to these units may be readily obtained.

In its development of Signal Control, Collective Control, Flying Stop Control, Department Store Control Elevators, Automatic Leveling, Automatic Door Operation, Escalators (Moving Stairways) and Dumbwaiters, the Otis Elevator Company has been able to meet the demands for superior and more intensive vertical transportation.

Strict adherence to the highest standard of workmanship and of material, both in manufacture and field construction, is a pre-requisite of the OTIS organization.

After installation, OTIS SERVICE protects the user, and assures highest operating efficiency of the plant at all times.

OTIS ELEVATOR COMPANY

Otis Elevator Building

600 West Jackson Boulevard

Chicago, Illinois

Telephone Monroe 6300

Offices in All Principal Cities of The World

MECHANICS LIEN LAW

State of Illinois

1. "Contractor" defined—lien upon real estate for material or labor furnished.
2. Liens for labor or material furnished by mistake.
3. Husband and wife.
4. Breach of contract by owner—recovery of material—other provisions.
5. Claims of sub-contractor—notice of to owner—owner's duty—contractor's liability—exceptions.
6. Time for completing contract.
7. Limitation as against third parties—claim for lien—proof of delivery sufficient.
8. Assigning liens or claims for liens.
9. Suit—how brought—joint suits—cross bill—dismissal—surprise—limitation.
10. Personal representatives—death of parties in interest.
11. "Parties in interest" defined—dismissal—notice.
12. Practice—powers of court—receivers.
13. Practice—answer—defense—counter claim.
14. Trials—delay—order for sale.
15. Preferences.
16. Incumbrances—pro rata benefits.
17. Costs—attorney fees.
18. Sales of estates—partial sales.
19. Proceeds of sale—application—preferences—deficiency and surplus.
20. Redemption.
21. "Sub-contractor" defined—preferences—limit of ability—abandonment of contract.
22. Partner after contract—statement of sub-contractor—failure—penalty.
23. Lien against public funds—public improvements—liability and duty of official.
24. Notice by sub-contractor—agents, architects and superintendents to be notified—form of notice.
25. Notice to non-residents.
26. Preferential liens.
27. Owners' duty after notice—preferences.
28. Suits by sub-contractor—proceedings.
29. Judgment before justice—transcript—executions.
30. General settlement—procedure.
31. Failure to complete contract—owner's liability to sub-contractor.
32. Wrongful payment of owner to contractor.
33. Limitation as to suit of sub-contractor.
34. General provisions.
35. Neglect—penalty.
36. Wrongful sale or removal of material—penalty.
37. Liens against water craft.
38. Filing claims—circuit clerk's duties—fees.
39. Construction of Act.
40. Repeals of Act of 1895.

AN ACT

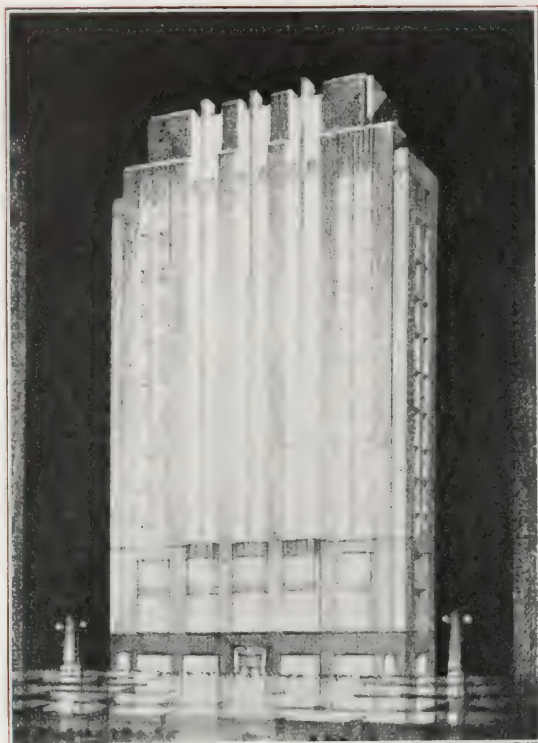
To Revise the Law in Relation to Mechanics' Liens; To Whom, What For and When Lien Is Given; Who Is a Contractor; Area Covered by and Extent of Lien; When the Lien Attaches. (Approved May 18, 1903; in Force July 1, 1903; as Amended by Act Approved June 16, 1913, in Force July 1, 1913.)

Section 1. **When Lien Given.)** Be it Enacted by the People of the State of Illinois, Represented in the General Assembly: That any person who shall by any contract or contracts, express or implied, or partly expressed or implied, with the owner of a lot or tract of land, or with one whom such owner has authorized or knowingly permitted to contract for the improvement of, or to improve the same, furnish material, fixtures, apparatus or machinery, forms or form work used in the process of construction where cement, concrete or like material is used for the purpose of or in the building, altering, repairing or ornamenting any house or other building, walk or sidewalk, whether such walk or sidewalk be on the land or bordering thereon, driveway, fence or improvement or appurtenances thereto on such lot or tract of land or connected therewith, and upon, over or under a sidewalk, street or alley adjoining; or fill, sod or excavate such lot or tract of land, or do landscape work thereon or therefor; or raise or lower any house thereon or remove any house thereto; or perform services as an architect or as a structural engineer for any such purpose; or furnish or perform labor or services as superintendent, timekeeper, mechanic, laborer or otherwise, in the building, altering, repairing or ornamenting of the same; or furnish material, fixtures, apparatus, machinery, labor or services, forms or form work used in the process of construction where concrete, cement or like material is used, on the order of his agent, architect, structural engineer or superintendent having charge of the improvements, building, altering, repairing or ornamenting the same, shall be known under this Act as a contractor, and shall have a lien upon the whole of such lot or tract of land and upon the adjoining or adjacent lots or tracts of land of such owner constituting the

same premises and occupied or used in connection with such lot or tract of land as a place of residence or business; and in case the contract relates to two or more buildings, on two or more lots or tracts of land, upon all such lots and tracts of land and improvements thereon for the amount due to him for such material, fixtures, apparatus, machinery, services or labor, and interest from the date the same is due. This lien shall extend to an estate in fee, for life, for years, or any other estate or any right of redemption, or other interest which such owner may have in the lot or tract of land at the time of making such contract or may subsequently acquire therein, and shall be superior to any right of dower of husband or wife in said premises, provided the owner of such dower interest had knowledge of such improvement and did not give written notice of his or her objection to such improvement before the making thereof; nor shall the taking of additional security by the contractor or sub-contractor be a waiver of any right of lien which he may have by virtue of this Act, unless made a waiver by express agreement of the parties; and this lien shall attach as the date of the contract. (As amended by Act approved June 28, 1919.)

Section 2. **Liens for Work or Materials by Mistake Put Upon Land Other Than the Contracting Parties.)** Any person furnishing services, labor or material for the erection of a building, or structure, or improvement, by mistake, upon land owned by another than the party contracting as owner, shall have a lien for such services, labor or material upon such building, or structure, or improvement, and the court, in the enforcement of such lien, shall order and direct such building, structure or improvement to be separately sold under its decree, and the purchaser may remove the same within such reasonable time as the court may fix.

Section 3. **Liens for Work or Materials Under Contract with Husband on Land of Wife.)** If any such services or labor are performed upon or materials are furnished for lands belonging to any married woman, with her knowledge and not against her protest in writing, as provided in Section 1 of



430 North Michigan Avenue, Chicago

Lundoff-Bicknell, Builders

Loebl, Schlossman & Demuth, Architects

THE 430 NORTH MICHIGAN BUILDING is an outstanding monument to architectural ingenuity. Embodying all of the latest features of office building construction and design, this structure possesses, to a marked degree, a note of distinction and desirability. In keeping with the high ideals exemplified in this edifice, the elevators were manufactured by the ELEVATOR COMPANY OF AMERICA. The elevator equipment operates at high speed variable voltage control, thereby rendering the superlative in elevator service.

Elevator Company of America

GEARED and GEARLESS

PASSENGER and FREIGHT ELEVATORS

190 N. State Street

Central 0323

this Act, in pursuance of a contract with the husband of such married woman, the person furnishing such labor or materials shall have a lien upon such property, the same as if such contract had been made with (the) married woman, and in case the title to such lands upon which improvements are made is held by husband and wife jointly, the lien given by this Act shall attach to such lands and improvements, if the improvements be made in pursuance of a contract with both of them, or in pursuance of a contract with either of them, and in all such cases no claim of homestead right set up by a husband or wife shall defeat the lien given by this Act.

Section 4. Breach of Contract by Owner—Recovery for Material—Partial Performance—Quantum Meruit—Right to Reclaim—Unused Material.) When the owner of the land shall fail to pay the contractor moneys justly due him under the contract at the time when the same should be paid, or fails to perform his part of the contract in any other manner, the contractor may discontinue work, and the contractor shall not be held liable for any delay on his part during the period of, or caused by, such breach of contract on the part of the owner; and if, after such breach for the period of ten days, the owner shall fail to comply with his contract, the contractor may abandon the work, and in such case the contractor shall be entitled to enforce his lien for the value of what has been done, and the court shall adjust his claim and allow him a lien accordingly. In such cases all persons furnishing material which has not been incorporated in the improvement shall have the right to take possession of and remove the same if he so elects.

Section 5. Contractors to Notify Owners of Sub-Contracts and Amounts of Their Claims—Owner's Duty with Regard Thereto and Rights in Case of Default—Contractor's Liability for Failure to Give Statement—Contractors to Whom This Section Does Not Apply.) It shall be the duty of the contractor to give to the owner, and the duty of the owner to require of the contractor, before the owner or his agent, architect or superintendent, shall pay or cause to be paid to said contractor or to his order any moneys or other consideration due or to become due such contractor, or make or cause to be made to such contractor any advancement of any money or any other consideration, a statement in writing, under oath or verified by affidavit, of the names of all parties furnishing materials and labor, and of the amounts due or to become due each. Merchants and dealers in materials only shall not be required to make statements herein provided for.

Section 6. Time for Completion of Contract.) In no event shall it be necessary to fix or stipulate in any contract a time for the completion or a time for payment in order to obtain a lien under this Act: Provided, that the work is done or material furnished within three years from the commencement of said work or the commencement of furnishing said materials.

Section 7. Limitations as Against Third Parties—Claim for Lien—What Shall Consist of—When Claim May be Filed and When Amended—As to Errors in—Proof of Delivery of Material, Not Use, Sufficient—Delivery of Material at One Building Good for All Buildings.) No contractor shall be allowed to enforce such lien against or to the prejudice of any other creditor or incumbrancer or purchaser, unless within four months after completion, or if extra or additional work is done or material is delivered therefor within four months after the completion of such extra or additional work or the final delivery of such extra or additional material, he shall either bring suit to enforce his lien therefor or shall file with the clerk of the Circuit Court in the county in which the building, erection or other improvement to

be charged with the lien is situated, a claim for lien, verified by the affidavit of himself, or his agent or employee, which shall consist of a brief statement of the contract, the balance due after allowing all credits, and a sufficiently correct description of the lot, lots or tracts of land to identify the same. Such claim for lien may be filed at any time after the contract is made, and as to the owner may be filed at any time after the contract is made and within two years after the completion of said contract, or the completion of any extra work or the furnishing of any extra material thereunder, and as to such owner may be amended at any time before the final decree. No such lien shall be defeated to the proper amount thereof because of an error or overcharging on the part of any person claiming a lien therefor under this Act unless it shall be shown that such error or overcharge is made with intent to defraud; nor shall any such lien for material be defeated because of lack of proof that the material after the delivery thereof, actually entered into the construction of such building or improvement, although it be shown that such material was not actually used in the construction of such building or improvement: Provided, it is shown that such material was delivered either to said owner or his agent for such building or improvement, to be used in said building or improvement, or at the place where said building or improvement was being constructed, for the purpose of being used in construction or for the purpose of being employed in the process of construction as a means for assisting in the erection of the building or improvement in what is commonly termed forms or form work where concrete, cement or like material is used, in whole or in part: And, provided, further, that in case of the construction of a number of buildings under contract between the same parties, it shall be sufficient in order to establish such lien for material, if it be shown that such material was in good faith delivered at one of the said buildings for the purpose of being used in the construction of any one or all of such buildings, or delivered to the owner or his agent for such buildings, to be used therein; and such lien for such material shall attach to all of said buildings, together with the land upon which the same are being constructed, the same as in a single building or improvement: And, provided, further, that in the event the contract relates to two or more buildings on two or more lots or tracts of land, then all of said buildings and lots or tracts of land may be included in one statement of claim for a lien. (As amended by Act approved June 16, 1913, in force July 1, 1913.)

Section 8. Assignability of Liens or Claims for Liens—Rights of Assignee.) All liens or claims for lien which may arise or accrue under the terms of this Act shall be assignable, and proceedings to enforce such liens or claims for lien may be maintained by and in the name of the assignee, who shall have as full and complete power to enforce the same as if such proceedings were taken under the provisions of this Act by and in the name of the lien claimant.

Section 9. When, How and in What Court Suit May be Brought—Two or More Lien Holders May Join in Bringing Suit—Answers Stand as Cross-Bills—Original Bill Cannot be Dismissed Without Consent of Parties—Lien Claimants May Contest Each Other's Claims Without Formal Issues of Record—Rights of in Case of Surprise—Limitation.) If payment shall not be made to the contractor having a lien by virtue of this Act of any amount due when the same becomes due, then such contractor may bring suit to enforce his lien by bill or petition in any court of competent chancery jurisdiction in the county where the improvement is located, and in the event that the contract relates to two or more buildings or two or more lots or tracts of land, then all of said buildings and lots or tracts of land may be in-

Climbing a 500-Foot Cliff In 37 Seconds!

A SEEMINGLY impossible feat—yet one which is performed hundreds of times daily by Pitt Elevators in the new Union Trust Building in Detroit.

Vertical transportation that is swift, safe, sure, silent, dependable and durable—these are the distinguishing factors of Pitt Elevators, using General Electric controls.

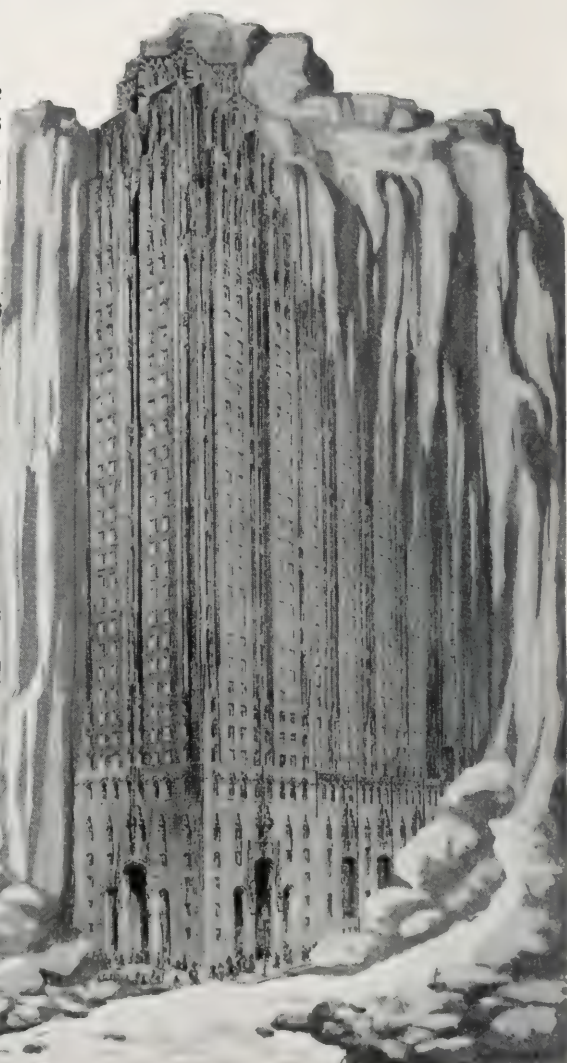
Architects, contractors and owners insisting on the highest standards of elevator service, find their requirements most fully and satisfactorily met in specifying Pitt Elevators!

PITT ELEVATORS PASSENGER AND FREIGHT

Using General Electric Controls



PITT ENGINEERING CO.
Detroit St. Louis Chicago



OTHER NOTABLE PITT ELEVATOR INSTALLATIONS

The Medical Arts Building	Minneapolis, Minn.
The David Stott Building	Detroit, Mich.
The Lake-Michigan Building	Chicago, Ill.
American Bankers Insurance Building	Chicago, Ill.
700 North Michigan Building	Chicago, Ill.
Ruth Automatic Garage	Chicago, Ill.

cluded in one bill or petition. Any two or more persons having liens on the same property may join in bringing such suit, setting forth their respective rights in their bill or petition; all lien claimants not made parties thereto may, upon application, become defendants and enforce their liens by answer to the bill or petition in the nature of an intervening petition, and the same shall be taken as a cross-bill against all the parties to such suit; and the said bill or petition shall not thereafter be dismissed as to any such lien claimant, or as to the owner or owners of the premises without the consent of such lien claimant. The complainant or petitioner, and all defendants to such bill or petition may contest each other's right without any formal issue of record made up between them other than that (shown) upon the original bill or petition, as well with respect to the amount due as to the right to the benefit of the lien claimed: Provided, that if by such contest by co-defendants any lien claimants be taken by surprise, the court may, in its discretion, as to such claim grant a continuance. The court may render judgment against any party summoned and failing to appear, as in other cases of default. Such suit shall be commenced or answer filed within two years after the completion of the contract, or completion of the extra or additional work, or furnishing of extra or additional material thereunder.

Section 10. Personal Representatives—Death of Parties in Interest.) Suits may be instituted under the provisions of this Act in favor of administrators or executors, and may be maintained against the representatives in the interest of those against whom the cause of action accrued, and in suits instituted under the provisions of this Act, the representatives of any party who may die pending the suit shall be made parties.

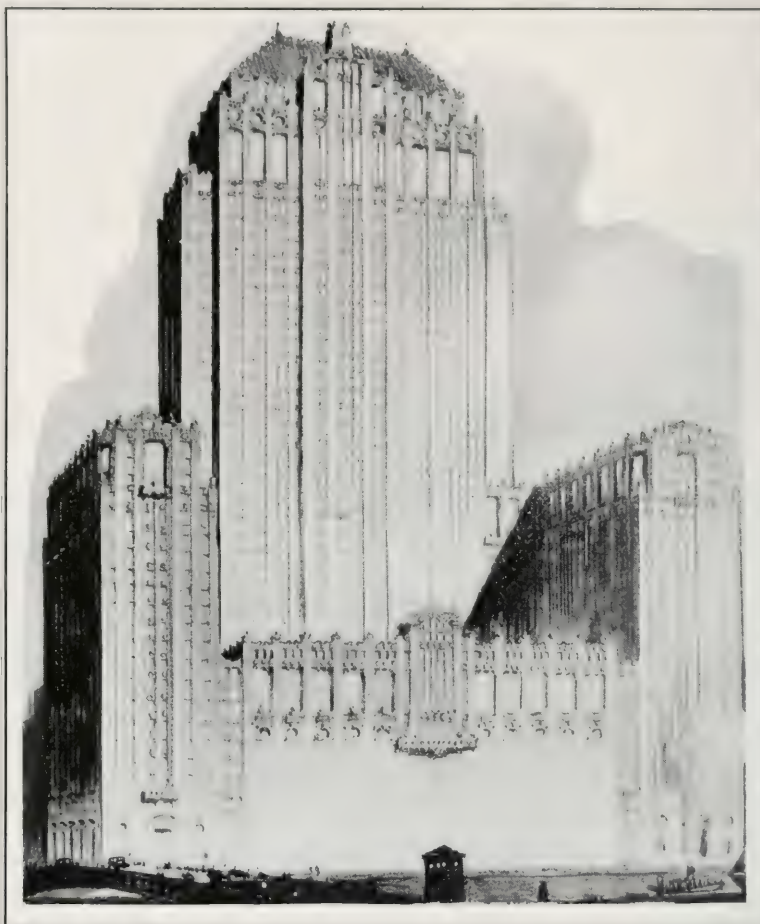
Section 11. Who Are Parties in Interest—How and When Made—Or May Become Parties to Suit—Publication, Service of Process on Non-Resident—Claims Not Due, Etc.—Pleading, Requisites of Bill or Petition—Diligence Required in Prosecuting Claim—When and How Party Bringing Suit May Dismiss Same.) The bill or petition shall contain a brief statement of the contract or contracts on which it is founded, the dates when made and when completed, if not completed, why, and it shall also set forth the amount due and unpaid, a description of the premises which are subject to the lien, and such other facts as may be necessary to a full understanding of the rights of the parties. Where plans and specifications are by reference made a part of the contract, it shall not be necessary to set the same out in the pleadings or as exhibits, but the same may be produced on the trial of the suit. The complainant or petitioner shall make all parties interested, of whose interest he is notified or has knowledge, parties defendant, and summons shall issue and service thereof be had as in suits in chancery; and when any defendant resides or has gone out of the State, or on inquiry cannot be found, or is concealed within the State, so that process cannot be served on him, the complainant or petitioner shall cause a notice to be given to him in like manner and upon the same conditions as is provided in suits in chancery, and his failure to so act with regard to summons or notice shall be ground for judgment or decree against him as upon the merits. The same rule shall prevail with cross-petitioners with regard to any person of whose interest they have knowledge, and who are not already parties to the suit or action. Parties in interest, within the meaning of this Act, shall include persons entitled to liens thereunder, whose claims are not, as well as are, due at the time of the commencement of suit, and such claim shall be allowed subject to a reduction of interest from the date of judgment to the time the claim is due; also all persons who may have any legal or equitable claim to the whole or any part of the premises upon which a lien may be attempted to be enforced under the

provisions thereof, or who are interested in the subject matter of the suit. Any such persons may, on application to the court wherein the suit is pending, be made or become parties at any time before final judgment. No action or suit under the provisions of this Act shall be voluntarily dismissed by the parties bringing the same without due notice to all parties before the court and leave of court upon good cause shown and upon terms named by the court.

Section 12. Practice—Powers of Courts—When Receivers May be Appointed.) The court shall permit amendments to any part of the pleadings, and may issue process, make all orders requiring parties to appear, and requiring notice to be given, that are or may be authorized in proceedings in chancery, and shall have the same power and jurisdiction of the parties and subject matter, and the rules of practice and proceedings in such cases shall be the same as in other cases in chancery, except as is otherwise provided in this Act. The court shall have power to appoint receivers for property on which liens are sought to be enforced in the same manner, for the same causes and for the same purposes, as in cases of foreclosure of mortgages, as well as to complete any unfinished building where the same is deemed to be to the best interest of all the parties interested.

Section 13. Practice—Answer—Defense—Right to Recover on Counter Claim.) Defendant shall answer the bill or petition under oath, unless the oath is waived by the claimant or petitioner. The owner shall be entitled to make any defense against the contractor by way of set-off, recoupment or counter claim that he could in any action at law, and shall be entitled to the same right of recovery on proof of such in excess of the claim of the contractor against the contractor only, but for matters not growing out of the contract such recovery shall be made without prejudice to the rights of the subcontractors thereunder for payment of the contract price or fund; and in event that the court shall find, in any proceeding in chancery, that no right to a lien exists, the contractor shall be entitled to recover against the owner as at law, and the court shall render judgment as at law for the amount which the contractor is entitled to, together with costs, in the discretion of the court. In any proceedings to enforce a lien, it shall only be necessary for all persons seeking a lien on account of wages due for labor to file in such proceedings an affidavit, giving the amount due, between what dates the same was performed and the kind of labor performed, and the court shall direct the amount due for wages as therein specified to be paid within a short day to be fixed by the court, unless within ten days after the filing of said claim for wages the amount claimed is contested by the owner or some other party to the suit, and in order to contest the amount due for wages it shall be necessary for the party making such contest to file an affidavit in which he shall state the defense he has to the allowance of such claim, and the court shall proceed at once to hear such evidence as the parties may adduce, and determine the merits as to the allowance of such claim for wages, and in the event that the allowance for wages is not paid within the time fixed by the court, then the court shall order the premises sold to pay such amount, in such manner as the court shall direct.

Section 14. Trials—Parties Ready Not to be Delayed—When Court May Delay Order for Sale or Distribution.) In no case shall the want of preparation for trial of one claim delay the trial in respect to others, but trial shall be had upon issues between such parties as are prepared, without reference to issues between other parties; and when one creditor shall have obtained a decree or judgment for the amount due, the court may order a sale of the premises on which the lien operates, or a part thereof, so as to satisfy the decree or judgment:



Nationally Recognized Elevator Standard of the Building World

Westinghouse Electric Elevator
reputation for effortless speed
and precise landing is indicative
of electrical and mechanical
perfection.



20 Wacker Drive
Building, Home of
The Chicago Civic
Opera Company
Westinghouse Ele-
vators-Car Switch
Variable Voltage
Control.

Graham, Anderson,
Probst & White,
Architects.

John Griffiths & Son
Company, Builders.

Westinghouse Electric Elevator Co.

Provided, that the court may, for good cause shown, delay making any order for sale or distribution until the rights of all the parties in interest are ascertained and settled by the court.

Section 15. Preference to Laborers—No Preference to First Contractors.) Upon all questions arising between different contractors having lien under this Act, no preference shall be given to him whose contract was made first, except the claim of any person for wages by him personally performed shall be a preferred lien.

Section 16. Incumbrances—Apportionment—On Improvements Made After Record of Incumbrance—Lien Holders Have Pro Rata Benefit in What Owner Pays For—Fraudulent Incumbrances—Disposition of.) No incumbrance upon land, created before or after the making of the contract under the provisions of this Act, shall operate upon the building erected, or materials furnished, until a lien in favor of the persons having done work or furnished material shall have been satisfied, and upon questions arising between incumbrances and lien creditors, all previous incumbrances shall be preferred to the extent of the value of the land at the time of making of the contract, and the lien creditor shall be preferred to the value of the improvements erected on said premises, and the court shall ascertain by jury or otherwise, as the case may require, what proportion of the proceeds of any sale shall be paid the several parties in interest. All incumbrances, whether by mortgage, judgment or otherwise, charged and shown to be fraudulent, in respect to creditors, may be set aside by the court, and the premises freed and discharged from such fraudulent incumbrance.

Section 17. Costs—How Taxed—Attorneys' Fees.) The costs of proceedings, as between all parties to the suit, shall be taxed equitably against the losing parties, and where taxed against more than one party shall be so taxed against all in favor of the proper party, but equitably as between themselves; and the costs, as between creditors aforesaid in contests relative to each other's claims, shall be subject to the order of the court, and the same rule shall prevail in respect to costs growing out of the proceedings against and between incumbrances. In all cases where liens are enforced, the court shall, in its discretion, order a reasonable attorney's fee taxed as a part of the costs in favor of the lien creditor.

Section 18. What Estate to be Sold—Manner of Making Sales, When Part May be Sold.) Whatever right or estate such owner had in the land at the time of making the contract may be sold in the same manner as other sales of real estate are made under decrees in chancery. If any part of the premises can be separated from the residue, and sold without damage to the whole, and if the value thereof is sufficient to satisfy all the claims proved in the cause, the court may order a sale of that part.

Section 19. Proceeds of Sale—Application of Pro Rata—Labor Claims Preferred—Deficiency Decrees—Excess, to Whom Paid.) The court shall ascertain the amount due each lien creditor, and shall direct the application of the proceeds of sale to be made to each in proportion to their several amounts, according to the provisions of this Act, but the claims of all persons for labor, as provided in Section fifteen (15) shall first be paid. If, upon making sale under this Act, of any or all premises, the proceeds of such sale shall not be sufficient to pay all claims of all parties, according to their rights, the decree shall be credited by the amount of said sale, and execution may issue in favor of any creditor whose claims are not satisfied for the balance due as upon a deficiency decree in the foreclosure of a mortgage in chancery, and such deficiency decree shall be a lien upon all real estate and other property of the party against whom it is entered to the same extent and under the same limitations as a judgment at

law; and in cases of excess of sales over the amount of the decree, such excess be paid to the owner of the land, or to the person who may be entitled to the same, under the direction of the court.

Section 20. Redemption.) Upon all sales under this Act, the right of redemption shall exist in favor of the same persons, and may be made in the same manner as is or may be provided for redemption of real estate from sales under judgments and executions at law.

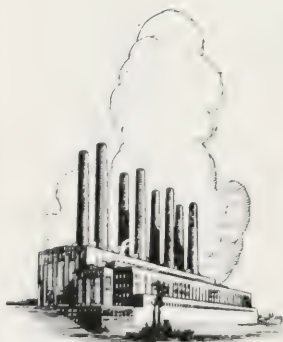
Section 21. Sub-Contractors — Liens of Sub-Contractors—Who Are—Extent of Their Liens Superior to Creditors or Contractors on Money Due Contractors—Duty of Owner and Contractor to File Notice of Waiver of Lien—Limit of Owner's Liability—Owner Liable for Sub-Contracts Performed After Notice Thereof—Rights of in Case Contractor Default May Complete, If Contractor Abandons.) Every mechanic, workman or other person who shall furnish any materials, apparatus, machinery or fixtures, or furnish or perform services or labor for the contractor, or shall furnish any material to be employed in the process of construction as a means for assisting in the erection of the building or improvement in what is commonly termed form or form work where concrete, cement or like material is used in whole or in part, shall be known under this Act as a sub-contractor, and shall have a lien for the value thereof, with interest on such amount from the date the same is due, from the same time, on the same property as provided for the contractor, and, also, as against the creditors and assignees, and personal and legal representatives of the contractor, on the material, fixtures, apparatus or machinery furnished, and on the moneys or other considerations due or to become due from the owner under the original contract. If the legal effect of any contract between the owner and contractor is that no lien or claim may be filed or maintained by any one, such provision shall be binding; but the only admissible evidence thereof as against a sub-contractor or material man, shall be proof of actual notice thereof to him before any labor or material is furnished by him; or proof that a duly written and signed stipulation or agreement to that effect has been filed in the office of the recorder of deeds of the county or counties where the house, building or other improvement is situated, prior to the commencement of the work upon such house, building or other improvement, or within ten days after the execution of the principal contract or not less than ten days prior to the contract of the sub-contractor or material man. And the recorder of deeds shall record the same at length in the order of time of its reception in books provided by him for that purpose, and the recorder of deeds shall index the same, in the name of the contractor and in the name of the owner, in books kept for that purpose, and also in the tract or abstract book of the tract, lot, or parcel of land, upon which said house, building or other improvement is located, and said recorder of deeds shall receive therefor a fee, such as is provided for the recording of instruments in his office.

In no case, except as hereinafter provided, shall the owner be compelled to pay a greater sum for or on account of the completion of such house, building or other improvement than the price or sum stipulated in said original contract or agreement, unless payment be made to the contractor or to his order, in violation of the rights and interests of the persons intended to be benefited by this Act: Provided, if it shall appear to the court that the owner and contractor fraudulently, and for the purpose of defrauding sub-contractors fixed an unreasonably low price in their original contract for the erection or repairing of such house, building or other improvement, then the

For Handling Coal and Ashes in the Power Plant Link-Belt Equipment

includes

*Crawler and Locomotive Cranes
Belt Conveyors Skip Hoists
The Peck Carrier Power Hoes
Conveyors and Elevators of every type
Chains for every service
Gondola Car Dumpers
Weigh Larries
Car Spotters
Water Intake Screens
Vibrating Screens
Coal Crushers
Portable Loaders*



Link-Belt designs and manufactures all standard types of coal and ashes handling equipment complete in Link-Belt plants, and is in a position to recommend the type of equipment which will serve best. Catalogs and particulars will be sent upon request.

Let us assist your Engineers

LINK-BELT COMPANY

Leading Manufacturers of Elevating, Conveying, and Power Transmission Machinery and Chains
CHICAGO, 309 W. Pershing Road INDIANAPOLIS, 200 S. Belmont Ave. PHILADELPHIA, 2045 W. Hunting Park Ave.

LINK-BELT

COAL AND ASHES HANDLING EQUIPMENT

court shall ascertain how much of a difference exists between a fair price for labor and material used in said house, building or other improvement, and the sum named in said original contract, and said difference shall be considered a part of the contract and be subject to a lien. But where the contractor's statement, made as provided in Section five (5), shows the amount to be paid to the sub-contractor, or party furnishing material, or the sub-contractor's statement, made pursuant to Section twenty-two (22), shows the amount to become due for material; or notice is given to the owner, as provided in Sections twenty-four (24) and twenty-five (25), and thereafter such sub-contract shall be performed, or material to the value of the amount named in such statements or notice, shall be prepared for use and delivery, or delivered without written protest on the part of the owner previous to such performance or delivery, or preparation for delivery, then, and in any of such cases, such sub-contractor or party furnishing or preparing material, regardless of the price named in the original contracts, shall have a lien therefor to the extent of the amount named in such statements or notice. Also, in case of default or abandonment by the contractor, the sub-contractor or party furnishing material, shall have and may enforce his lien to the same extent and in the same manner that the contractor may under conditions that arise as provided for in Section four (4) of this Act, and shall have and may exercise the same rights as are therein provided for the contractor. (As amended by Act approved June 16, 1913, in force July 1, 1913.)

Section 22. Where Partners Taken in After Contract—Lien for Material Furnished to Sub-Contractor—Lien of Sub-Contractor—Statement of Sub-Contractor to Owner or Contractor—Penalty for Failure to Give Statement.) Whenever, after a contract has been made, the contractor shall associate one or more persons as partners or joint contractors, in carrying out the same, or any part thereof, the lien for materials or labor furnished by a sub-contractor to such contractor and his partners or associates, as originally agreed upon, shall continue the same as if the sub-contract had been made with all of said partners. When the contractor shall sub-let his contract, or a specified portion thereof, to a sub-contractor, the party furnishing material to or performing labor for such sub-contractor shall have a lien therefor and may enforce his lien in the same manner as is herein provided for the enforcement of liens by sub-contractors. Any sub-contractor shall, as often as requested in writing by the owner or contractor, or the agent of either, make out and give to such owner, contractor or agent, a statement of the persons furnishing material and labor, giving their names and how much, if anything, is due or to become due to each of them, and which statement shall be made under oath if required. If any sub-contractor shall fail to furnish such statement within five (5) days after such demand, he shall forfeit to such owner or contractor the sum of fifty (\$50) dollars for every offense, which may be recovered in an action of debt before a justice of the peace, and shall have no right of action against either owner or contractor until he shall furnish such statement, and the lien of such sub-contractor shall be subject to the liens of all other creditors.

Section 23. Lien Against Fund Due or to Become Due—Contractors for Public Improvements, Notice—Duty and Liability of Officer Notified.) Any person who shall furnish material, apparatus, fixtures, machinery or labor to any contractor having a contract for public improvement for any county, township, school district, city or municipality in this State, shall have a lien on the money, bonds or warrants due or to become due such contractor under such contract: Provided such person shall, before payment or delivery thereof is made to such contrac-

tor, notify the official or officials of the county, township, school district, city or municipality whose duty it is to pay such contractor of his claim by a written notice; and, provided further, that such lien shall attach only to that portion of such money, bonds or warrants against which no voucher or other evidence of indebtedness has been issued and delivered to the contractor by or on behalf of the county, township, school district, city or municipality, as the case may be, at the time of such notice. It shall be the duty of any such official so notified to withhold a sufficient amount to pay such claim until the same is admitted by the contractor, or adjusted by the agreement of the parties, or there has been an adjudication of the same in a court of competent jurisdiction, and thereupon to pay the amount so determined to be due such claimant, if any, and to that end the said county, township, school district, city or municipality, or any of the other parties interested may institute suit in the same manner as is provided herein in case of privately owned real estate to determine the rights of the parties when such claim is filed.

Any person who shall furnish material, apparatus, fixtures, machinery or labor to any contractor having a contract for public improvement for the State, may have a lien on the money, bonds or warrants due or about to become due such contractor under the contract, by filing with the official whose duty it is to pay such contractor a sworn statement of the claim showing with particularity the several items and the amount claimed to be due on each; but the lien shall attach to only that portion of the money, bonds or warrants against which no voucher or other evidence of indebtedness has been issued and delivered to the contractor by or on behalf of the State.

The person so claiming a lien shall, within thirty (30) days after filing notice with the State official, commence proceedings by bill in equity for an accounting, making the contractor to whom such material, apparatus, fixtures, machinery or labor was furnished, party defendant, and shall, within the same period notify the official of the State of the commencement of such suit by delivering to him a certified copy of the bill filed: provided, that suit shall be commenced and a copy of the bill served upon the State official not less than fifteen (15) days before the date when the appropriation from which such money is to be paid, will lapse. It shall be the duty of the State official after the sworn statement has been filed with him, to withhold payment of a sum sufficient to pay the amount of such claim, for the period limited for the filing of suit, unless otherwise notified by the person claiming the lien.

Upon the expiration of this period the money, bonds or warrants so withheld shall be released for payment to the contractor unless the person claiming the lien shall have instituted proceedings and served the official of the State with the certified copy of the bill as herein provided, in which case, the amount claimed shall be withheld until the final adjudication of the suit is had: Provided, the State official may pay over to the clerk of the court in which such suit is pending, a sum sufficient to pay the amount claimed to abide the result of such suit and be distributed by the clerk according to the decree rendered.

Any payment so made to such claimant or to the clerk of the court shall be a credit on the contract price to be paid to such contractor. Any officer violating the duty hereby imposed upon him shall be liable on his official bond to the claimant serving such notice for the damages resulting from such violation, which may be recovered in an action at law in any court of competent jurisdiction. There shall be no preference between the persons serving such notice, but all shall be paid pro rata in proportion to the amount due under their respective contracts. (As amended by Act approved June 28, 1919.)

WELLER

CONVEYING MACHINERY

To Handle the Raw Materials or Finished Products

GIVES THE SERVICE



WE MAKE

Apron Conveyors
Belt Conveyors
Chain Conveyors
Drag Conveyors
Spiral Conveyors
Bucket Elevators
Barrel Elevators
Package Elevators
Portable Elevators
Storage Bins
Skip Hoists
Coal and Ash Handling
Equipment
Heavy Sheet Metal
Work
Structural Steel Work
Etc.

For Over Thirty Years

The Weller Manufacturing Co. has made material handling machinery which is doing duty in a great number of the largest as well as small industrial plants in the world—our organization is fully equipped to take care of any material handling proposition put up to them.

Without Obligation on Your Part

Our engineers are at your service to assist and suggest the equipment best adapted to your requirements.

WELLER MFG. CO.

1820-1856 N. Kostner Ave.

CHICAGO, ILL.

Phone Albany 4200

Section 24. Notice to the Owner by Sub-Contractor—Limitation for Service of—May be Served on Owner, Agent, Architect or Superintendent in Charge—Duties and Liabilities of Agents, Architect and Superintendent Notified—Excuse of Notice—Sub-Contractors Protected to Amount Named in—Form of.) Sub-contractors, or party furnishing labor or materials, may at any time after making his contract with the contractor, and shall within sixty (60) days after the completion thereof; or, if extra or additional work or material is delivered thereafter, within sixty (60) days after the date of completion of such extra or additional work or final delivery of such extra or additional material, cause a written notice of his claim and the amount due or to become due thereunder, to be personally served on the owner or his agent or architect, or the superintendent having charge of the building or improvement: Provided, such notice shall not be necessary, when the sworn statement of the contractor or sub-contractor provided for herein shall serve to give the owner notice of the amount due and to whom due, but where such statement is incorrect as to the amount, the sub-contractor or material man named shall be protected to the extent of the amount named herein as due or to become due to him.

The form of such notice may be as follows: To (name of owner): You are hereby notified that I have been employed by (name of contractor) to (state here what was the contract or what was done, or to be done, or what the claim is for) under his contract with you, on your property at (here given substantial description of the property) and that there was due to me, or is to become due (as the case may be) therefor, the sum of dollars.

Dated at this day of A. D.

Signature

Section 25. Notice to Non-Resident Owner by Filing Claim with Circuit Court, What Claim Shall Consist of—When Itemized Account Not Necessary.) In all cases where the owner, agent, architect or superintendent cannot, upon reasonable diligence, be found in the county in which said improvement is made, or shall not reside therein, the sub-contractor or person furnishing materials, fixtures, apparatus, machinery, labor or services may give notice by filing in the office of the clerk of the Circuit Court against the person making the contract and the owner a claim for lien verified by the affidavit of himself, agent or employee, which shall consist of a brief statement of his contract or demand, and the balance due after allowing all credits, and a sufficient correct description of the lot, lots or tract of land to identify the same. An itemized account shall not be necessary.

Section 26. Lien of Laborers Preferred—Limitation as to Laborer's Notice.) The claim of any person for wages as a laborer under Sections fifteen, twenty-one and twenty-two of this Act shall be a preferred lien.

Section 27. Owner's Duty to Retain and Pay Money After Notice—Preference to Laborers—Manner in Which He Shall Make Payment—Liability of Owners.) When the owner or his agent is notified as provided in this Act, he shall retain from any money due or to become due the contractor, an amount sufficient to pay all demands that are or will become due such sub-contractor, tradesman, materialmen, mechanic or workmen of which claim he is notified, and shall pay over the same to the parties entitled thereto.

Such payments shall be as follows:

First—All claims for wages shall be paid in full.

Second—The claims of tradesmen, materialmen and sub-contractors, who are entitled to liens, pro rata, in proportion to the amount due them respectively. All payments made as directed shall, as between such owner and contractor, be considered the same as if paid to such contractor. Any

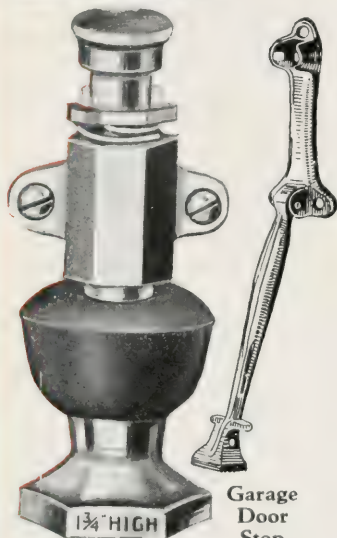
payment made by the owner to the contractor after such notice, without retaining sufficient money to pay such claims, shall be considered illegal and made in violation of the rights of the laborers and sub-contractors, and the rights of such laborers and sub-contractors to a lien shall not be affected thereby, but the owner shall not be held liable to any laborer and sub-contractor or other person whose name is omitted from the statement provided for in Sections five (5) and twenty-two (22) of this Act, nor for any larger amount than the sum therein named as due such person (provided such omission is not made with the knowledge or collusion of the owner), unless previous thereto or to his payment to his contractor, he shall be notified, as herein provided, by such person of their claim and the true amount thereof.

Third—The balance, if any, to the contractor.

Section 28. Suits to Enforce Lien by Sub-Contractors—When Can be Brought, Pleadings, Action at Law Against Owner and Contractor—Proceedings, Extent of Owner's Liability.) If any money due to the laborers or sub-contractor be not paid within ten (10) days after his notice is served, as provided in Sections five (5), twenty-four (24), twenty-five (25) and twenty-seven (27), then such person may either file his petition and enforce his lien as hereinbefore provided for the contractor in Sections nine (9) to twenty (20), inclusive, of this Act, except as to the time within which suit shall be brought, or he may sue the owner and contractor jointly for the amount due him in any court having jurisdiction of the amount claimed to be due, and a personal judgment may be rendered therein, as in other cases. In such actions at law, as in suits to enforce the lien, the owner shall be liable to the plaintiff for no more than the pro rata share that such person would be entitled to with other sub-contractors out of the funds due to the contractor from the owner under the contract between them, except as hereinbefore provided for laborers, and such action at law shall be maintained against the owner only in case the plaintiff establishes his right to the lien. All suits and actions by sub-contractors shall be against both contractor and owner jointly, and no decree or judgment shall be rendered therein until both are duly brought before the court by process of publication, and in all courts, including actions before a justice of the peace and police magistrate, such process may be served and publication made as to all persons except the owners, as in suits in chancery. All such judgments, where the lien is established, shall be against both jointly, but shall be enforced against the owner only to the extent that he is liable under his contract as by this Act provided, and shall recite the date from which the lien thereof attached according to the provisions of Sections one (1) to twenty (20) of this Act, but this shall not preclude a judgment against the contractor personally, where the lien is defeated.

Section 29. Judgment Before Justice of the Peace—When Transcript of May be Filed—Execution Thereon—Liens Thereof.) If the execution issued on a judgment obtained before a justice of the peace or police magistrate shall be returned not satisfied, a transcript of such judgment may be taken to the Circuit Court and spread upon the records thereof, and execution issued thereon as in other cases except that the lien of the same shall be preserved as a preferred lien on the property improved from the date recited in the judgment, and enforced thereon the same as if a decree had been rendered by the Circuit Court in a suit to enforce such lien under the provisions of this Act.

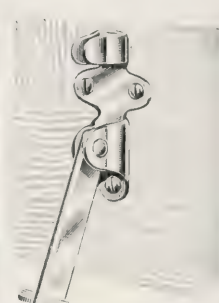
Section 30. Proceedings for General Settlement—Interpleader—How Liens and Claims Cut Off and Judgments Thereon Stayed in Such Proceedings.) If there are several liens under Sections twenty-one (21) and twenty-two (22) upon the same prem-



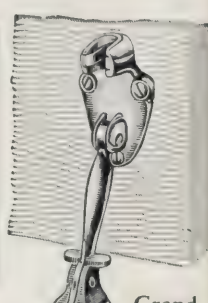
Garage Door Stop



Grand Peerless
Made of Best Bronze Metal.



Grand Standard
Formed Out of Brass Metal.



Grand Ideal
Made of Best Malleable Black or Bronze.

A Complete Line of Doorstops and Door Holding Devices

BUMPERS, LEVER or PLUNGER HOLDERS
OVERHEAD DOOR HOLDERS & CHECKS

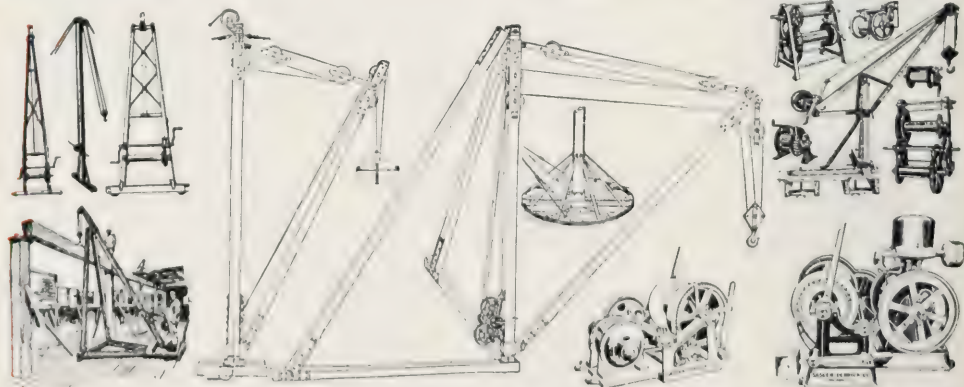
Our Motto is "Satisfaction"

GRAND SPECIALTIES CO.

3101 Grand Ave.

CHICAGO, ILL.

Telephone Van Buren 1243



A Complete Line of **DERRICKS and WINCHES**
up to 10 Ton Capacity

SASGEN DERRICK CO.

3101-29 GRAND AVENUE

CHICAGO, ILL.

ises, and the owner or any person having such a lien shall fear that there is not a sufficient amount coming to the contractor to pay all such liens, such owner or any one or more persons having such lien may file his or their bill or petition in the Circuit Court of the proper county, stating such fact and such other facts as may be sufficient to a full understanding of the rights of the parties. The contractor and all persons having liens upon or who are interested in the premises, so far as the same are known to or can be ascertained by the claimant or petitioner upon diligent inquiry, shall be made parties. Upon the hearing the court shall find the amount coming from the owner to the contractor, and the amount due to each of the persons having liens, and in case the amount found to be coming to the contractor shall be insufficient to discharge all the liens in full, the amount so found in favor of the contractor shall be divided between the persons entitled to such liens pro rata after the payments of all claims for wages in proportion to the amount so found to be due them respectively. If the amount so found to be coming to the contractor shall be sufficient to pay the liens in full, the same shall be so ordered. The premises may be sold as in other cases under this Act. The parties to such suit shall prosecute the same under the requirements as are directed in Section eleven (11) of this Act, and all persons who shall be duly notified of such proceedings and who shall fail to prove their claims, whether the same be in judgment against the owner or not, shall forever lose the benefit of and be precluded from their liens and all claims against the owner. Upon the filing of such bill or petition the court may, on the motion of any person interested, and shall, upon final decree, stay further proceedings upon any suit against the owner on account of such liens, and costs in such cases shall be adjusted as provided for in Section seventeen (17).

Section 31. Failure to Complete Contract by Contractor—Requisites and Manner of Sub-Contractor's Suit in Case of—Owner's Liability in Case of.) Should the contractor, for any cause, fail to complete his contract, any person entitled to a lien as aforesaid may file his petition in any court of record against the owner and contractor, setting forth the nature of his claim, the amount due, as near as may be, and the names of the parties employed on such house or other improvements subject to liens; and a notice of such suit shall be served on the persons therein named, and such as shall appear shall have their claim adjudicated. The premises may be sold as in other cases under this Act. The parties to such suit shall prosecute the same under like requirements as are directed in Section eleven (11) of this Act.

Section 32. Payment of Owner to Contractor—When Wrongful.) No payments to the contractor or to his order of any money or other considerations due or to become due to the contractor shall be regarded as rightfully made, as against the sub-contractor, laborer or party furnishing labor or materials, if made by the owner without exercising and enforcing the rights and powers conferred upon him in Sections five (5) and twenty-two (22) of this Act.

Section 33. Limitation as to Suit of Sub-Contractors to Enforce Lien.) Petition shall be filed or suit commenced to enforce the lien created by Sections twenty-one (21) and twenty-two (22) of this Act within four months after the time of the final payment is due the sub-contractor, laborer or party furnishing material.

Section 34. General Provisions—Suit to be Commenced or Answer Filed by Lien Claimants, and Within Thirty (30) Days on Demand of Owner, Lienor or Interested Party.) Upon written demand of the owner, lienor or any person interested in the real estate, or their agent or attorney, served on the person claiming the lien, or his agent or attorney, requiring suit to be commenced to

enforce the lien, or answer to be filed in a pending suit, suit shall be commenced, or answer filed within thirty days thereafter, or the lien shall be commenced or answer filed within thirty days thereafter, or the lien forfeited, and same released if a claim for a lien has been filed with the clerk of the Circuit Court.

Section 35. Neglect to Satisfy Lien Paid or to Release Where Not Sued on Time—Penalty.) Whenever a claim for lien has been filed with the clerk of the Circuit Court, either by the contractor or sub-contractor, and is afterward paid with cost of filing same, or where there is a failure to institute suit to enforce the same after demand, as provided in the preceding section, within the time by this Act limited, the person filing the same or someone by him duly authorized in writing so to do shall acknowledge satisfaction or release thereof, in the proper book in such office, in writing on written demand of the owner, and on neglect to do so for ten days after such written demand, he shall forfeit to the owner the sum of twenty-five (25) dollars, which may be recovered in an action of debt before a justice of the peace.

Section 36. Penalty for Wrongful Sale, Use or Removal of Materials.) Any owner, contractor, sub-contractor or other person who shall purchase material on credit and represent at the time of purchase that the same are to be used in a designated building or buildings, or other improvement, and shall thereafter sell, use or cause to be used, the said materials in the construction of, or remove the same to any building or improvement other than that designated or dispose of the same for any purpose, without the written consent of the person of whom the materials were purchased, with intent to defraud such person, shall be deemed guilty of a misdemeanor and, on conviction, shall be punished by a fine not exceeding five hundred dollars (\$500), or confined in the county jail not exceeding one year, or both so fined and imprisoned.

Section 37. Liens Against Boats, Barges and Water Craft.) Any architect, contractor, sub-contractor, materialman or other person furnishing services, labor or material for the purpose of or in constructing, building, altering, repairing or ornamenting a boat, barge or other water craft, shall have a lien on such boat, barge or other water craft for the value of such services, labor or material in the same manner as in this Act provided for services, labor or material furnished by such parties for the purpose of building, altering, repairing or ornamenting a house or other building. And such lien may be established and enforced in the same manner as liens are established and enforced under this Act, and the parties shall be held to the same obligations, duties and liabilities as in case of a contract for building, altering, repairing or ornamenting a house or other building.

Section 38. Circuit Court Clerk's Duties with Regard to Claims Filed—Abstract Fee.) When claims for liens are filed pursuant to the provisions of Sections seven (7) and twenty-five (25), the clerk of the Circuit Court shall endorse thereon the date of filing, and make an abstract thereof, in a book kept for that purpose and properly indexed, containing the name of the person filing the lien, the amount of the lien, the date of filing, the name of the person against whom the lien is filed, and a description of the property charged with the lien, for which the person filing the lien shall pay one dollar (\$1.00) to the Clerk.

Section 39. This Act is and shall be liberally construed as a remedial Act.

Section 40. An Act entitled, "An Act to revise the law in relation to mechanic's liens," approved and in force June 26, 1895, and all other Acts and parts of Acts inconsistent with this Act are hereby repealed: Provided, that this section shall not be construed as to affect any rights existing or actions pending at the time this Act shall take effect.

Hurd's Rev. St. 1916, p. 1655, chap. 82 sec. 15.



Pierce Anderson Memorial

Graham, Anderson, Probst & White, Architects

THE OLD AND RELIABLE
CHAS. G. BLAKE CO.

Designers and Builders of
MONUMENTS—MAUSOLEUMS
HEADSTONES

Granite and Marble Building Work
HAULING and SETTING

Thirty-seventh Year under Personal Management of CHAS. G. BLAKE

LOOP OFFICE:
State Bank Building
 120 So. LaSalle Street
 Phone: CENTral 5573-5571

Display Yard and Shops:
1000 East 67th Street
 Phone: FAIRfax 9876-9877
OPEN SUNDAYS

Memorials Erected Anywhere in the United States and Canada

INDEX TO BUILDING ORDINANCE

Copyright—1929 by H. L. Palmer

See Special Rulings of Building Department, Page 315
Zoning Ordinance, Page 331

A

Access to room, Class VI:	
Requirements	670
Accident: Elevator (lift); duty of owner to report	895 (c)
Acetylene Gas: Building requirement and location, Class I.....	455 (b)
Air Requirement. (See ventilation.)	
Aisles—	
Class Iva	509
Class IVb	526
Class IVc	546, 549
Class IVd	570
Class V	595, 617
Class VII	690
Class VIII	705
(See also General Index, Code 1922, under Fire Prevention and Public Safety.)	
Alcove Room: Definition and requirement	648, 677
Alley or Yard, rear of: Class VI structures; requirement	643
Alteration—	
Conformity with governing law....	725-727
Constructing provisions of building law relating to alteration.....	727 (a)
Notice to Commissioner of use for which building is intended.....	727 (c)
Notice to owner, etc., to comply with law	727 (b)
Retrospective provisions to control when	727 (a) (b)
Rooms and halls in existing tenements: Provision for certain floor and window areas.....	675-678
School (Class VIII): Requirement.....	697 (f)
Wall: Increasing thickness of—requirement	734
Amphitheater—	
Regulations governing	578 (a)
Amusement Park—	
Buildings erected within: Requirement	574
Frame buildings—space between.....	575
Included in Class IVd.....	567
Moving picture theater to comply with Class IVc	574 (c)
Roller Coasters—all requirements.....	576-578
Amusements, Places of:	
Diagram of seats and exits.....	941
License: Certificates from city officials required before issuance.....	936
Lighting of building and of exits.....	937-8
Lights: Gas, Calcium and Arc.....	939
Obstructions (including locks, doors or gates) prohibited	940
Penalty	942
Seats and Exits: Diagram of.....	941
Ante-room or Reception Room—	
Ventilation.....	470 (e 1 & 2) and (g 2, 3 & 4)
Apartment Building or House—	
Definition	634 (b)
(But see the heading "Tenement and Apartment House.")	
Arbitration—	
Appeal for arbitration.....	407 (a) (b)
Appeal from decision of arbitrators.....	407 (c)
Deposit to cover cost of proceedings.....	407 (c)
Form of decision.....	407 (c)
Oath of arbitrators.....	408
Power to examine witnesses.....	408
Arches: Segmental and flat; requirement in F. P. construction.....	852-3
Architect: Certification of plans.....	439, 446
(See also "Structural Engineer.")	
Architectural Engineer: Duties and Bond	417, 427

Area—

Class IVb: Vent or flue pipes over stage	535
Class IVc: Vent or flue pipes over stage	560
Class VI: Courts.....	644
Class VI: Percentage of lot allowed to be covered.....	642
Class III: Habitable room.....	488
Class VI: Room requirements.....	677-9
Class VII: Floor (maximum).....	685
Towers, domes and spires—limitation.....	806
Arenas—	
Regulations governing	578 (a)
Asbestos chimney lining.....	796
Ash chute in wall, construction.....	801
Ashlar facing, when considered part of wall	748
Assembly Hall—	
Included in Class IV.....	
Definition	515
Asylum: Included in Class IId and Class III.	
Athletic Park—	
Included in Class IVd.	
Attic—	
Class VI, height and cubic feet of air space—use for sleeping room.....	678
Dry cleaning structure; prohibited in	458 (d)
Habitable room.....	488, 647, 678
Automatic Sprinkler System.	
(See "Sprinkler System.")	
Automobiles: Buildings for housing and storage	456

B

Bakeries—	
Included in Class II.	
In passenger stations; provision for maintenance in	411
Ventilation requirement.....	470 (d)
Water closet: Provision for.....	304
Balcony (as part of ladder fire escape)—	
General specifications	885
Hospital specifications	482
Balcony (over street): Permit for erection prerequisite	434
Balcony (theater, etc.)—	
Class IVb: Designation—exit and entrance	524-5
Class IVc: (non-fire proof building) number allowed.....	548
Class V: Designation.....	594, 616
Barn: See "Stables and Barns."	
Baseball Park: See "Amusement Park."	
Basement—(See also "Cellar.")	
Class VII: Structural requirement—salesroom allowed	684
Concrete floor requirement.....	659, 815
Construction requirement.....	814
Damp-proofing	659
Definition, Class VI.....	634 (h)
Definition, general	813
Definition as applied to three-story and basement high tenement.....	656 (b)
Dry cleaning structure; basement not allowed in	458
English basement	634 (h)
Floor (concrete) requirement.....	659, 815
Frame building: Requirement where basement or story is placed beneath	872
Garage: Prohibited in—exception.....	456 (a)
Habitable room in cellar prohibited—	
Habitable room in cellar or basement prohibited—exception	651, 679

In a moved house (brick or frame)—height and walls—requirements as to living rooms	679 (b)
Living rooms—when permitted in Class VI	679 (a)
Nuisance—when declared	680, 943
Prohibited in garage structure—exception	456
Salesroom permitted (sub-basement) ..	684
School—when used for class room (Class VIII)	710
Sub-basement and cellar: Structural requirement and limitation	814
Tenement: Masonry or concrete walls; concrete floor—damp-proofing	659
Two and three-story building: Thickness of basement wall	732 (d) (e)
Bath Room—	
Class III: Requirement	490
Class VI: Requirement	650
Bay Window—	
Construction, Class III	491
Construction, general	787
Wall material, Class VI	660
Beams—	
Metal: Allowable stress	754
Reinforced concrete design	761
T-Beams: Limit of flange width	763
Beams, Girders and Trusses:	
Covering in F. P. construction	846
Beams (Spandrel), Girders and Linte's:	
Covering in F. P. construction	845
Bearing: Rivets and pins	754 (a)
Belt Course	435
Bending (metals): Allowance	754 (a)
Billboards, Signboards and Signs:	
(See also "Illuminated Signs".)	
General provisions governing	903, 919
Alteration or repair: Requirement ..	910
Bond (penal) requirement	914
Duty of Commissioner of Buildings ..	913
Erection and maintenance: Requirement	909
Face: Size limitation and material within fire limits	904-5
Fees: Erection and Inspection	442(c) 914
Fire Limits: Erection within	904-5
Fire Limits: Erection without	907
Flat against surface of building: Requirement	903
Frontage consent	915
Height, and level above ground of existing structures	912
Height allowed outside fire limits	907
Height allowed within fire limits	905
Illuminated and other Roof Signs:	
Governing provisions	919 (a) to (f)
Inspection of Signs and Billboards ..	913-14
Material to be used	904-907
Owner's name on structure	913
Penalty for unlawful construction or maintenance	916
Permit	909
Plan requirements	909-910, 913
Prohibited maintenance of existing structures when in violation of law ..	912
Real estate signboards: Requirement ..	906
Roof: Not to be placed upon or above ..	903
Similar structures: Provisions of this Article (XXIII) to apply	908
Tearing down: Power of Commissioner of Buildings	913
Wind pressure: Construction requirement	911
Block: Definition of word in connection with frontage consents	920
(See also heading "Square.")	
Boarding Stable. (See "Stables and Barns" and "Frontage Consents.")	
Boiler (Steam):	
Dry cleaning establishment: Location ..	458
Garage: Boiler room regulations	456
Location-Permit (general regulations) ..	803
Bond (Penal):	
Billboard, Signboard, etc., construction, etc.	914
Building operations—proof of Indemnifying Bond to protect city against damage, etc.	441 (a)
Department of Buildings:	
Commissioner	397
Subordinates	427
Illuminated Roof Sign	919 (d)
Street obstruction	828
Wreckers	443 (b)
Bonding: (See "Brickwork" under "Brick.")	
Bracing of walls and skeleton frame work	736
Brick—	
Brickwork: Requirements	750
Class III: Wall on wood sill	492
Garage (public): Use in construction ..	456
Joints (horizontal and vertical) how filled	751
Laying: Manner prescribed—Drenching	751
Soft: Limitation as to use	749
Veneer for frame building	868 (c)
Brick Buildings: Requirements as to moving	728
(See also Sec. 923.)	
Building—	
Classification of all kinds	488
Alterations on stamped plans prohibited—Exception	440
Alterations in old building or from class to class	727
Annual inspection: Several duties of Commissioner of Buildings, owners etc.	445
Building operation at night in residential districts, prohibited	829
Building, Unclassified: Class to be determined by Com'r of Buildings ..	448
Certificates and notices: Commissioner to keep record—open to inspection ..	411
Certificates—new tenement	637
Class: Two or more: Used for any particular class: Requirement	449
Class IVb: Existing building used for Class IVb and other purposes: Restriction	518
Class IVb: Seats not fixed: Computed space for each person	520
Class IVc hereafter constructed: Requirement	515
Class V now in existence: Construction to comply with Sec. 732	585
Class of buildings not to be changed unless, etc.	726
Classes built in conjunction with Class V: Connecting door requirement ..	587
Complaints and inspections—record to be kept	413
Conflict between special and general provisions—Special provisions to govern—Exception	450
Construction, alteration and repair (including sheds), and inspection fees ..	442
Construction in relation to height: Class I	453
Construction (Classes I, II, III, IV, V, VI, VII, VIII, IX) to comply with general and special provisions	452, 468, 484, 495-6, 580, 633, 682, 696, 715
(Construction (Class IVb): Character of ..	519
Construction or wrecking in violation of law—Power of Commissioner of Buildings	404-405-406
Contractors for Buildings—Registration, etc.	899, 901-2
Damage or depreciation: Percentage to govern matter of repair or rebuilding (Class VI)	674
Distance between buildings on same lot—Provision for one-story structures in rear	641

Distance between building and lot line in Class III.....	488 (b)
Dry Cleaning: Requirements.....	458
Encroachment (foundation of structure) on public highway—notice to Dep't Buildings (accompanied by plans)	434, 436
Enforcement of law: Duty of Police.....	410
Entry and closure: Power given to certain officials.....	429, 497-8, 581-2, 713
Explosives: Requirements	455
Existing buildings—Provisions of Art. IX not to apply, etc.—Exception....	675
Exposition purposes: Seats, boxes, booths, etc., allowed (Class IVb)....	519
Fees for permits for construction and repair (including sheds), and inspection	442
Films (motion picture): Requirements	459
Fire wall—Requirement for more than one on same lot.....	874
Flats, conversion into: Requirement as to interior walls (within fire limits)	869
FRAME:	
Basement or story placed beneath a raised building: Requirement....	872
Chimney requirements	873
Construction within fire limits: Regulation	868
Height limitation outside fire limits	868 (b)
Ingress and egress in old building—required alterations	727
Lot: Area limitation of frame building or buildings.....	874
Lot line—rear: Provision for one-story building	641
Lot line requirements in connection with frame structures.....	874
More than one frame building on same lot: Requirement.....	874
Motor driven vehicles—housing requirements	456 (b)
Moving: Requirement.....	405, 654, 728, 923
Moving picture or theatrical show prohibited in frame building.....	545
Permits under authority of the Department. See the heading "Permits."	
Plans—Examination and approval..	413
Raising or changing one-story to two-story: Requirements	871
Raising: Requirement	870
Repair within fire limits: Regulation	867
Roof: Change of gable or hip to flat roof: Requirement.....	870
Room—change in existing—window requirement	677, 678
Smoking of Meats: Requirement..	457
Uniform height (where raised): Requirement	871
Veneer of Brick: Limitation.....	868 (c)
Where prohibited within fire limits: Exception—Requirement	863 (a)
Front and rear of lot (Class VI): Restrictions as to building.....	641
Garage: Regulating location.....	929
Garage, other provisions. (See General Index, Code 1922).	
Icemaking house or cooling plant: Frontage consents	932
Manufacturing purposes (Class VII): Requirement	684
One-story structures on rear of lot: Provision for	641
"Overturning moment" due to wind pressure	729 (b)
Penalty for violation of building laws (General)	945
Permit: Temporary withholding.....	928
Plans. (See the heading "Plans.")	

Projection of any part into street prohibited unless by permit.....	434, 436
Rear of lot: Provision for one-story structures	641
Residential districts: Business of a store—permit for erection—requirement	927
Residential districts: Building operations at night prohibited.....	829
Retail sale of goods: Stores requirement	684
Seats in Class IVb where not fixed: Computed space for each person..	520
Space requirements between building and lot line.....	488 (b)
Stoppage of unlawful construction or wrecking—Power of Commissioner..	406
Store: Building designed for use as: Stories, numbering of.....	689
Requirement as to permit.....	927
Theatrical purposes (Class IVb): Character of construction.....	519
Unclassified Building: Requirement of structure subject to determination by Commissioner of Buildings, etc.....	448 (r)
Unsafe building or structure: Notice to owner—Sign on structure—Power to tear down or cause evacuation..	403-406
Used for purposes of more than one class—Construction requirements...	449
Ventilation of buildings.....	933 (a)
Water used in connection with building operation: Fees.....	441
Wind pressure	454 (a), 729 (b), 807, 911, 918
Wreckers and wrecking: (See "Wrecking.")	
Building Contractors: Registry with Dept. of Bldgs., etc.....	899, 901-2
Building Units of Cinder Concrete.....	780
Buildings, Department of—	
Establishment of department, the various officials, bond requirements, etc.	296-447
<hr/>	
Architectural Engineers: Duties....	416
Bonds:	
Commissioner	397
Subordinates	427
Building Inspector in charge and assistants	418-20
Certificates—issuance, etc.....	411
Clerical assistants	426
Commissioner: Appointment—Duties, Powers and Responsibilities.....	397, 399-413, 416, 419-426, 429-431, 433-441, 443-447, 537, 561, 606, 629, 727, 918
Deputy Commissioner	414-415
Elevator Inspector in charge and assistants	421-424
Engineering staff	416
Fees—account and report.....	412
Fees: Building erection permits..	433, 442
Building extension permits.....	430
Erection of Bill Boards or Signboards, chimneys (isolated), fire escapes, illuminated roof signs and tanks on roofs, Installation of elevators, miscellaneous inspection..	442
Plans and Drawings.....	433
Inspections and Complaints record..	413
Personal liability of the Commissioner	400
Plans:	
Essentials of	439
Examination and approval.....	413, 432
Police to assist, when, etc	410
Power of Commissioner to pass upon ordinances	401
Records, inspection open to city officials	411
Secretary of Department.....	425

Bulkhead— (Class VI: Roof—Requirement.....	663	Doors, corridors, hallways and pass- ageways: Requirement	510
Bunting and Draperies: Limitation as to uses	519	Doors to open outward.....	512
Buttress— In connection with enclosing wall—re- quirement	732	Emergency exit	512
In connection with wall of altered structure	734	Exit and entrance.....	507
C			
Caisson Foundation. (See "Founda- tion.")		Exposure (street frontage) require- ment	502-503
Canopy (or Marquise)— Erection: Requirement	816	Floor level and limitation.....	506
Capacity: Allowance for church where seats are not fixed.....	513	Gallery: Exit and entrance.....	508
Capacity (number of persons) allowed for each room in theaters: Commis- sioner of Buildings to determine, etc. .....537, 561, 606, 629		Garage: Not to locate nearer than 200 feet from	929
Catchbasin—Class VI: Requirement..673b-c		Lighting service requirement.....	514
Ceiling: Erection of structures over— Class IVb: Requirement	533	Live load allowance.....	507
Class IVc: Requirement	557	Seats: Number in a row.....	511
Class V: Requirement (hereafter erected)	623	Seats not fixed: Capacity.....	513
Class VI: Requirement	658	Stable or barn: Distance regulation.830 (c)	
Cellar— Cement floor in new tenement.....	659	Stairway requirement	507
Construction (misc. provisions).....	814	Tannery: Distance regulation.....	831
Definition	634 (i)	Chute: Ash and Rubbish: Wall form- ing — requirement.....	801
Habitable rooms prohibited in: Excep- tion	651, 679	Cinder Concrete. (See "Concrete" below.)	
Nuisance—when	680	Classes of Buildings: Not to be changed unless, etc.....726, 727	
Cellar and Sub-basement— Construction (Miscellaneous provi- sions)	814	Classification (in general).....	448
Cement— Basement floor requirement.....	815	When in doubt, to be determined by Commissioner of Buildings.....448 (r)	
Mortar affected by frost—prohibited use	742	Classification of Buildings— Class I: Embraces structures designed for merchandise (other than depart- ment stores); barns, stables and gar- ages or for housing automobiles with a ground area of 500 or more square feet	451-460
Portland only to be used in reinforced concrete construction—Tests.....	768	Class II (Subdivisions IIa, IIb, IIc): Embraces structures designed for of- fice and club house (sleeping accom- modation for less than twenty persons) (IIa); hotel, club, lodging or rooming house (sleeping accommodations for 20 or more persons) (IIb); hospital (sleep- ing accommodations for more than 10 persons), "Home," day nursery or asy- lum (housing more than 10 bed-ridden or decrepit persons), jail, house of cor- rection or detention (IIc).....467-482	
Cement: (See also "Concrete.")		Class III: Embraces structures de- signed for private residence, hospital (sleeping accommodations for ten or less persons), "home," day nursery or asylum (accommodating twenty or less persons or not more than ten bed-ri- den or decrepit persons), and barn, stable or garage with ground area of less than five hundred square feet. 483-493	
Certificates and Notices: Record of is- sance—open to inspection.....	411	Class IV (Subdivisions IVa, IVb, IVc, IVd, IVe and V): Embraces struc- tures designed for church (IVa); hall (parish, lodge, dance, banquet, assem- bly, exposition and exhibition, instruc- tion [other than public school]), skat- ing rink; also existing hall used for theatrical purposes at time of passage of this law, except those included in IVa, IVc, IVd, IVe and V (IVb); mov- ing picture and vaudeville shows (seat- ing capacity not to exceed three hun- dred—existing buildings to comply with Class IVc) (IVc); grandstand and baseball, athletic and amusement park (IVd)	494-578
Certification of Plans, by either licensed architect or structural engineer.....	439	Class V: Embraces theater buildings of the first class and moving picture thea- ters seating over 1,000.....679-631	
Chimney— Class VI: Requirement (including flue)	662	Class VI: Embraces structures designed for tenements and apartments.....632-680	
Class VI: Boiler chimney as distin- guished from domestic flue.....	792	Class VII: Embraces structures designed for so-called department stores....681-694	
Encroachment upon street or alley pro- hibited (external location).....	798	Class VIII: Embraces structures de- signed for school purposes.....695-713	
Flue: Insulating lining—Requirement	794	Class IX: Embraces building required by city for police station purposes....	714-724
Flue: Requirement (Class VI).....	662	Class not to be changed without con- forming, etc.....726, 727	
Flue: Walls forming—Requirement..	800	Clay Tile— Hollow building tile.....780 (a)	
Frame structure: Structural require- ment	873	Protection of, while building progresses .....840 (b)	
Heating apparatus in tenement and apartment house not considered as flues used for domestic purposes...	792	Wiring on columns.....840 (b)	
Height above roof: What determines.	793		
Interior: Requirement	797		
Isolated: Requirement	799		
Lining	796		
Metal in fireproof building	796		
Metal: Insulating material	796		
Metal, in Ordinary, Slow-burning or Mild construction	795		
Reinforced concrete	790-791		
Repair: Permit required. See General Index, Code 1922.			
Stack (metal): Insulating material..	796		
Stress	796		
Church— Included in Class IVa.			
Aisle requirement	509		
Amusement, place of: Distance from church: (See under "Amusements" Sec. 190, Code 1922.)			
Construction requirement	504		

Cleaning (Dry) Plants. (See under "Dry Cleaning.")	
Cleaning Windows: Safety device required	788
Closing a Building for a Cause:	
Class IV	498
Class V	582
Class VIII	713
Clubhouse: Included in Class II.	
Coal, etc., Shed. (See "Shed.")	
Column—	
Bracing (also covering Trusses, Walls, etc.), in steel skeleton construction.	781
Cast iron: Length limit.	754 (g)
Cast iron: Limitation as to use.	754 (h)
Clay tile, wiring on.	840
Dead and live load requirement (with tables)	731
Exterior protection	838
Fireproof construction: Requirements	838-840
Maximum allowable stress.	754 (c-d-e)
Protection while building progresses	840 (b)
Reinforced concrete construction: Requirement	764
Skeleton steel construction: Requirements	781
Steel: Filled with or encased in concrete—Allowable stress	754 (d)
Steel: Filled but not encased in concrete—Allowable stress	754 (e)
Steel (structural): Filled with concrete—Allowable stress.	765
Terra Cotta Hollow Tile: Requirement	779 (c-d)
Commissioner of Buildings and Assistants. (See "Buildings, Department of.")	
Complaints: Record to be kept.	413
Compression: Metals	754 (a), 757
Concrete—	
Approved cement and ingredients (fireproof construction)	841-842
Basement floor: Requirements.	815
Building Units: Regulating Use.	780
Cinder concrete in relation to Building Units	780
Cinder concrete—composition	780
Cinder concrete used in conjunction with mill construction.	864 (b)
Filling in steel columns: Stress allowances	754 (d), (e), 765
Fireproof concrete construction.	776-778
Garage (public): Concrete wall.	456 (a)
Hollow block wall: When allowed (Classes III and VI).	732 (q)
Joints to be made full and solid.	842 (d)
Moving: Requirement	728
Piling for foundations: Test piles and tests	744
Sand and stone used in: Quality demanded	769, 770, 842
Steel rails or beams embedded in concrete: Requirement	745
Note— See also "Reinforced Concrete construction."	
Concrete Building: Requirement as to moving	728
Conductor Pipes. (See "Pipes from Roof.")	
Conduit: Embedment in connection with Fireproof construction	843 (b)
Conflict of Sections Relating to Classes:	
Class VI to govern in respect to tenements	635
Construction:	
Contrary to approved plans: Voidance of permit	447
To comply with all provisions of Building laws	725
Types of: (See "Fireproof," "Mill," and "Slow-burning" construction.)	
Violation of law: Authority to tear down or stop.	404-6
Contractors: Licensing, etc.	899, 901-2
Cooling Plant. (See "Ice House" and "Ice Making House.")	
Corner Lot Defined.	639
Cornice: Requirement as to material, etc.	805
Cornice, Belt Course, Water Table: Allowable projection	435
Corridor: Definition	634 (f)
Corridors and Passageways: Width:	
Computation:	
Class IVa	510
Class IVb	527
Class IVc	550
Class V	596, 618
Court, Light and Vent Shafts:	
Definition	634 (d)
Class III: Requirement	488 (b)
Class VI: Requirement	644, 658, 669
Class VI: Requirement (as to drainage)	669
Class IX: Requirement.	719
General construction requirements.	786-787
Court Room (City Courts):	
Class IX: Exits: Requirement.	723
Coves. (See "Hospitals.")	
Cupola (Foundry): Construction requirements	804
Curtain—	
Sliding curtains in schools (Class VIII). Requirement	708
Class IVb: Requirement	532
Curtain: Asbestos, Iron or Steel—	
Class IVc: Requirement.	555
Class V: Requirement.	600, 620
Curtain Wall. (See "Wall.")	
D	
Damage by Fire: Proportion of to govern rebuilding or repair (Class VI)...	674
Dangerous or Unsafe Building: Duty of Commissioner on complaint of citizen—Removal by Fire Department.	403, 405
Day Nursery: Included in Class IIc and Class III.	
(See also "Homes.")	
Definitions:	
Alcove and alcove room.	648
Apartment (by itself).	634 (b)
Balcony or gallery (Class IVb).	524
Basement	634 (h), 813
(See also 656 (b).)	
Block, as used in this Chapter in connection with frontage consents.	920
Cellar	634 (i)
Of Class I.	451
Of Class II.	467
Of Class IIa.	471
Of Class IIb.	473
Of Class IIc.	477
Of Class III.	483
Of Class IV.	494
Of Class IVa.	501
Of Class IVb.	515
Of Class IVc.	543
Of Class IVd.	567
Of Class V.	579
Of Class VI.	632
Of Class VII.	681
Of Class VIII.	695
Of Class IX.	714
Corner lot	639
Court (Class VI): "Inner," "Lot Line" and "Outer"	634 (d)
"English" basement	634 (h)
Existing tenement	634 (a)
Fire Limits	934
Fireproof Construction	833
Fireproof material	834
Habitable room	488
Hall (public)	634 (f)
Hall (stair)	634 (g)
Illuminated Roof Sign.	919
Loads (live and dead).	729
Masonry (First class).	747 (b)
Mill construction	863
New tenement.	634 (a)
Ordinary construction	866
Primary bearing wall (Terra cotta construction)	779 (e)

Reinforced concrete	758	Class IVb	530
Reinforced Terra Cotta Hollow Tile..	779	Class IVc	553
Stubble, coursed and ordinary.....	747 (b)	Class V	599 (c-h), 619 (c-h)
Scenery (Class IVb).....	539	Class VIII	704
Scenery (Class V).....	630	Class IX	724
Shaft (in connection with tenement building)	634 (e)	Projection over public space prohibited	460 (a)
Slow-burning construction	860	Revolving: Requirement:	
Square	928	Class I	460
Story	634 (j)	Class II	469 (b)
Tenement house (existing).....	634 (a)	Class VII	692
Tenement house (new).....	634 (a)	Inspection requirements.....	445
Terra Cotta Hollow Tile (reinforced) 779		Uses in certain classes prohibited...	878
Wall: Length	732 (i)	Stage wall openings: Self-closing fireproof doors	556
Wall: Primary bearing of hollow tile	779 (e)	Where not permitted.....	878 (e)
Wall: Terms used in construction....	747	Width: Computation:	
Yard	634 (c)	Class I.....	460 (b)
Department of Buildings:		Class IVa.....	510
Employees not to engage in outside employment	428	Class IVb	527
Establishment	396	Class IVc	550, 552
Officers: Appointment—Bond—Duties —Powers and Limitations.....	396-447	Class V	596-7, 618
Department Store:		Wired glass: Requirement.....	784
Basement. (See "Sub-basement" below.)		Doors, Windows and Openings, and Use of Metal Frames and Wired Glass: Requirement (not applicable to frame buildings or to certain structures outside fire limits).....	784
Construction: Concerning	683	(See also "Glass, Wired.")	
Courts and light shafts: Requirement	688	Downspout. (See heading, "Pipe." See also Sec. 3014, Code 1922, as amended July 22, 1926.)	
Doors: Requirement	692-693	Draperies and Bunting: Limitation as to use	519
Dressing rooms.....	684 (c)	Dry Cleaning Structure:	
Exit signs and lights: Requirement..	691	Included in Class I.	
Floor areas: Limitations.....	685-686	Structural requirement	458
Galleries, mezzanine or intermediate floors: Provisions concerning.....	687	See also Sec. 1416, Code of 1922, as amended May 26, 1896, pp. 3610-12.	
Loads: Allowance for live.....	694	Dumb Waiter—	
Locker provisions	684	Enclosure in fireproof construction.844 (a)	
Manufacturing purposes: Requirement	684 (a)	Enclosure in non-fireproof construction 892	
Stairs and stairways: Requirements. 690		Eaves—	
Stories: Designation of first story, etc.	689	Requirement as to buildings over 50 feet high	805
Sub-basement: Sale of goods allowed —when	684	Electric Lighting. See "Lighting Service Requirement."	
"Department Store" Building: Included in Class VII.		Electric Service: Cut-out box, etc., not to encroach on F. P. covering.....	851
Deposits and Fees.	441-442	Elevator (dumb waiter): Shaft enclosure—Requirement	844 (a), 892
(See also "Fees.")		Elevator (grain)—	
Derrick. (See "Sidewalk and Street, Etc.")		Class I: Fireproof construction requirement	466
Dividing Wall. (See "Wall.")		Tile (terra cotta) cylindrical construction	779 (f)
Domes. (See "Towers." Etc.)		Elevator (lifts)—	
Door—		Enclosure in garage building.....	456 (a)
Automatic rolling and steel shutter in Classes I, II, IV, V, VII and VIII.784 (a)		Enclosure of machinery on roof 809, 812 (d)	
Class IVb: Width computation (also applies to corridors, hallways and passageways)	527	General provisions governing construction and enclosing.....	887-898
Class IV(c): Requirement.....	552	Hospital: Requirement	481
Class VI: Requirement as to water closet	671	Power to stop operation.....	898
Class VII: Requirement.....	692-3	Safety device	895
Connecting doors built in conjunction with Class V: Requirement.....	587	Emergency Exits: Provisions governing—	
Court and light shaft: Construction requirement	786 (b)	Class III	493
Dividing wall: Character and construction	789	Class IVa.....	506 (b), 507, 508, 512
Elevator (lift): Equipment and locking device	893	Class IVb	529, 538
Elevator hatch door or closer: Construction and other requirements	894	Class IVc	552, 562
Fire-doors Class IV(b).....	517 (c)	Class V	599, 613 (d), 619
Fire-resisting glass panel (Class I) 460 (a)		Class VI	664
Incombustible: Requirement.784, 789, 844		School	706
Inspection	445 (1)	Employees in Department of Buildings not to engage in another business....	428
Iron: Requirement	781 (b)	Encroachment on Public Highway....	434, 436
Metal or metal-clad:		Engineering Practice: Application of principles.....	730 (a), 779 (f), 781 (b), 807
Requirement, Class I....	456, (a-b), 460	"English" Basement	634 (h)
Requirement, Class V.....	596, 599, 602, 613 (d), 618-19	Entry: Power given to certain officials.	429, 497, 581
Requirement, Class VII.....	692, 693	Exits: Revolving doors, where credited as exits (See also "Doors").....	460 (b)
Requirement (In the several classes)	784 (a)	Exits (emergency), Class V.....	599
Obstruction:		Explosives: Building for storage: Requirement	455 (a)
Class IVa	512 (b)		
Class IVb	519		
Opening outward:			
Class IVa	512 (b)		

Exposition Buildings: Temporary seats, boxes, showcases, platforms and booths of combustible material: When allowed (Class IVb)	519
Exposure (street frontage)—	
Class IVa	502, 503
Class IVb	516
Class IVc	544
Class V	610 (a)

F

Fees:

Annual accounting of fees paid in by Commissioner of Buildings.....	412
Annual inspection of a building.....	442, (c), 445 (h)
Arbitration proceedings (in case of appeal)	407 (c) -8
Billboard or signboard (erection and inspection)	442 (c), 914
Building (alteration or repair).....	442 (b)
Buildings and sheds, erection.....	442 (a) (c)
Canopy: Erection permit.....	816
Chimney (isolated): Erection.....	442 (c)
Curtain (asbestos): Inspection.....	442 (c)
Curtain (iron or steel): Inspection.....	442 (c)
Elevator (lift): Inspection.....	442 (c)
Elevator (lift): Installation or alteration	442 (c)
Fence	917
Fire Escape: Erection.....	442 (c), 882 (c)
Floor strength placard.....	464 (c)
Illuminated and other roof signs: Erection and inspection.....	919 (c)
(See also Sec. 442 (c).)	
Moving frame building.....	923 (a)
Moving building (other than frame)	442 (b)
Placard (floor strength).....	464 (c)
Raising permit	442 (b)
Roller coaster permit.....	577 (b)
Shed erection	442 (a)
Shoring up	442 (b)
Signboards and Billboards.....	442 (c), 914
Signs, illuminated and others.....	442 (c)
Street obstruction permit (during building construction)	828
Tank on roof (substructure).....	783
Tank on tower or roof: Installation: (in excess of 400-gallon capacity)	442 (c)
Underpinning	442 (b)
Water used in building operation.....	441 (b)
Wrecking	443 (a)
Fence—	
Construction requirements	917-18
Wind resistance.....	918
Film Storage: Building and vault requirement	459
Fire Escape—	
General provisions governing.....	881-6
Balcony (on ladder or stairway type): General specifications.....	884 (b), 885
Change in construction or position prohibited, unless, etc.....	886
Class IIc: Requirement	482
Class III: Requirement (hereafter erected)	493
Class IVb	521 (b)
Class VI: Requirement	668
Class VIII: Requirement	712
Construction allowed in courts and light shafts	787 (c)
Hospitals: Requirement	482
Inspection of unsafe escapes where complaint is made.....	402
Prohibited use of building until equipped	882 (m)
Fire Limits (Including Provisional Fire Limits)	934
Fire limits—Map showing—Provision for	935
Fire Stops: Class IIb (non-fireproof buildings)	475 (c)
Fireproof Construction:	
Definition	833
General provisions	833-859
Acetylene gas building.....	455 (b)

Arches: Requirement	852-853
Belt, cable wire, conduit, conveyor, dumb-waiter or pipe: Enclosure requirement	844 (a)
Bin (storage), grain elevators and warehouses: Cylindrical construction	779 (f)
Buildings (of other classes) built in conjunction with Class V to be fireproof	611
Casings, doors, windows, etc., surrounding floor openings: Construction requirement	844 (c)
Cement (approved)	841
Cinder concrete ingredients.....	780
Class I: Requirement	453 (a-b)
Class I (Garage): Requirement.....	456 (b)
Class IIa: Requirement	472 (a-b)
Class IIb: Requirement.....	474 (a-b)
Class IIc: Requirement	478 (b)
Class III: Requirement	485 (a-b)
Class IV: Requirement	500
Class IVa: Requirement	504
Class IVb: Requirement	517-519, 521 (a-b)
Class IVc: Requirement (in part)	543-545
Class IVd: Requirement (grandstand)	569 (a)
Class IVd: Requirement (Amusement Park Buildings)	574 (b)
Class V: Requirement	586-7, 609-11
Class VI: Requirement.....	652, 658 (a)
Class VII: Requirement	683
Class VIII: Requirement	697 (c-d)
Class IX: Requirement.....	716 (b)
Columns: Exterior and interior.....	838-9
Concrete: Approved cement	841
Concrete: Cinder	780
Concrete ingredients	842
Concrete construction	776-778
Covering for spandrel beams and beams, girders and lintels: Requirement	845-6
Electric service box, etc.: Not to encroach on thickness of fireproofing..	851
Enclosure requirement for belt, cable wire, conduit, conveyor, dumb-waiter or pipe	844 (a)
"Equally good" fireproofing material: Tests	784 (j), 835
Explosives: Building for.....	455 (a)
Film Storage, Requirement.....	459
Fireproof material, definition.....	834
Floor construction	853
Floor openings: Material in doors, casings, windows, etc.....	844
Garage	456
Grain elevator	466
Grain elevator: When of cylindrical construction	779 (f)
Incombustible material: When so considered	836
Lime: Use of in F. P. covering.....	843 (b)
Motion picture film storage structure.....	459
Motor-driven vehicle building.....	456 (a)
Mullions: Requirement	847
Partition requirements	855-856
Pipe not to be enclosed in the fireproofing of columns or other structural members: Exception.....	843
Pipe or conduit: Embedment.....	843
Pipe or conduit, etc.: Enclosure.....	844
Reinforced concrete: When acceptable	776
Roof construction	853
Roof: Rise above wall height.....	858
Shaft enclosing pipe, conduit, dumb waiter, cable wire, conveyor or belt, etc.: Requirement	844 (a)
Shaft enclosure: When omitted.....	844 (d)
Sheet metal work, support of.....	859
Skeleton wall: Independent support.....	849
Skewback of arches, requirement.....	852 (c)
Smoking meats: Requirement.....	457
Stairs and landings—Construction.....	857
Structural members: Covering.....	848
Tenements	652, 658
Terra Cotta Hollow Tile Construction: Requirements	779
Tests of mode or manner of constructing or installation of "equally good" fireproofing material	784 (j), 835

Wall facing support.....	850	Minus 40 Chicago datum—Require-	43.
Walls enclosing steel skeleton structures: Requirement	837	Pile (wood and concrete): Requirement	743-4
Wood floor and nailing strips: Use prescribed	854	Projecting into street, etc.: Permit—Requirements	434, 436
Fireproof Material—		Steel rails or beams in concrete.....	745
Definition	834	Stress in connection with live and dead loads.....	731
Tests of "equally good".....	784 (J), 835	Stress allowance in pounds per sq. in. on plain cement and masonry.....	746
Fireworks Storage Building. (See "Storage Structures.")		Support below ground on city-owned construction prohibited.....	740 (c)
Flange: T Beams—limit of width.....	763	Wall, old and new—requirement where there is an increase in thickness....	742
"Flat" Building:		Wet soil requirement.....	739
Included in Class VI.....	634 (a)	Foundry Cupola: Construction—height above roof	804
Frame converted into flats: Requirements	869	Foundry or Machine Shop: Restrictions as to building within 200 feet of residence. (See General Index, Code 1922.)	
(See also "Tenement and Apartment House.")		Frame Building: (See "Building.")	
Flat Slab	761-2	Frontage: (See "Exposure.")	
Floor—		Frontage Consent — General Requirements	933
Basement: Concrete requirements.....	659, 815	Note: Consult also the "Zoning Law" of April 5, 1923, on this subject.	
Class I: Requirement	456	Acid (sulphuric, nitric or hydrochloric) manufacture	921
Class I: Requirement (film storage).....	459	Ammonia manufactory	921
Class III: Requirement	487	Amusement building	924
Class IVa: Requirement	507	Amusement: Out-door exhibitions, etc.	571
Class IVb: Requirement	522	Amusement Park	573
Class IVd: Requirement	568	Asphalt manufacture or refining.....	921
Class V: Requirement.....	588, 589	Automobile repair shops. (See General Index, Code 1922.)	
Class V: Requirement (hereafter erected)	614-616	Barns and Stables.....	830b, 921
Class VI: Requirement (area in altered room)	678	Billboard or Signboard.....	915
Class VII: Requirement (areas).....	685-6	Blacksmith Shop	921
Class VII: Requirement (intermediate)	687	Block: Definition of word in connection with subject-matter.....	920
Class IX: Requirement	717	Boarding or livery stable or stable for more than five horses.....	921
Film storage: Requirement (Class I) ..	459	Boiler making	921
Fireproof requirement.....	853, 854	Bones or wood distillation: Place for.	921
Floor system (structural): Use of anchor—joists—splicing	732 (m)	Brass or copper works.....	921
Garage: Mezzanine: When considered an additional floor (Class I).....	456 (a)	Buildings in provisional fire limits.....	934 (o)
Intermediate or mezzanine floor: Requirement (including permit and plans), Class VII.....	687 (e)	Celluloid manufactory	921
Levels requirement:		Cement or plaster-of-Paris manufactory ..	921
Class IVa	506	Chlorine or bleaching powder manufactory ..	921
Class IVb	521	Class IVC. buildings.....	566
Class IVc	546	Class IVD. (Grandstands and amusement parks).....	569 (b), 573
Class V (now in existence).....	588, 591	Class Vd. (Temporary seating structure) (for Outdoor Exhibitions, Holiday Observances and Special Occasions)	571
Class V (hereafter erected).....	612	Copper or brass works.....	921
Loads: See "Loads, live and dead.")		Day nurseries	930
"Main floor" in Class V: Designation.	594	Dextrine (or glucose) manufactory.....	921
Mezzanine, (See "Intermediate" above.)		Factories, etc., using machinery or emitting noxious fumes, or making noise	921
Opening in garage structures (Class I)	456 (a)	Factory (combined with a foundry)....	921
Opening protection in F. P. construction	844	Factory (textile)	921
Strength placard: Requirement—Fee (Class I)	464	Fertilizer manufactory	921
Temporary, in buildings under construction: Provision for.....	818	Frame building moving	923 (a)
Wood in fireproof construction: Use—Requirement	854	Garage (public)	929
Floor Loads: (See "Loads, live and dead.")		Note: See also Sec. 2279(b), Code 1922.	
Flue. (See "Chimney.")		Gas manufactory	921
Forms used in concrete work: Removal requirement	777	Gas reservoir	921
Foundation—		Gelatin or size manufactory.....	921
Allowable stress—Bearing on soils....	738	Glucose or dextrine manufactory.....	921
Borings required: When.....	743 (a)	Glue factory	921
Caisson: Requirement	436	Hides or skins—storing or scraping.....	921
Concrete piles allowable: Requirement	744	Holiday occasions, shows, out-door exhibitions, etc.	571
Construction: Material entering into.	741	"Homes." See Sheltering Institutions, below.	
Eccentric loads, provision for.....	731	Horseshoeing shop	921
Encroachment or extension into street, etc.: Permit—Requirement—Territorial restrictions	434, 436	Hospital	479
Extension below surface: Requirement	740	Hospital or "Home".....	930
Footing to rest on hard soil or rock in made ground	740 (a)	Ice house or cooling plant.....	932
Foundation, old and new walls	742	Incineration or reduction of garbage, etc., plant	921
Frost, and matter of protection against	742		
Joint foundation, new and old walls: Requirement	742		
Load limitation on various soils.....	738		
Made ground or loam, etc.: Prohibited laying—Exception	740 (a)		

Iron or steel works.....	921	Class VII: Area and other require- ments	687
Junk store or yard.....	921	Garage (500 or more sq. ft. ground area): (Included in Class I.)	
Lamp black manufactory.....	921	Garage (Less than 500 sq. ft. ground area): (Included in Class III.)	
Laundry (run by machinery).....	921	Garage—	
Lime kiln	921	Automobile housing: Structural re- quirement	456
Linoleum manufactory	921	Boiler in basement: When permitted.....	456 (a)
Livery, sale or boarding stable.....	921	Buildings erected or altered for garage purposes, Class I: Structural re- quirement — Equipment — Limita- tions, etc.	456
Meats: Business of selling.....	926	Dividing wall in fireproof construc- tion	456
Medical Dispensary	921	Fireproof construction or with sprink- ler system: Structure must be one or the other.....	456
Metal Refinery	921	Floor openings in non-fireproof build- ing: Requirement	456
Monument works (run by machin- ery)	921	Frontage consents and the "150 foot" provision	929
Moving frame building.....	926 (a)	Housing of Motor Vehicles in Fireproof Apartment Hotels and Apartment Buildings: See ordinance in re at end of this Building ordinance.	
Oil cloth manufactory.....	921	Note: See also Sec. 2279(b), Code 1922.	
Oil or Turpentine manufactory.....	921	Living rooms in connection with.....	456 (b)
Out-door Exhibitions, etc.....	571	Location as to school, hospital or church	929
Packing House	921	Metal frame windows.....	456
Paint or Varnish manufactory.....	921	Structural requirements	456
Planing (or saw) mill.....	921	Gas Lighting: (See "Lighting Service Requirement.")	
Plaster-of-Paris or Cement manufac- tory	921	Gas Reservoir:	
Printing ink manufactory.....	921	Frontage consents	921
Provisions, store for selling.....	926	Location limited as to school.....	832
Reduction or Incineration of Garbage plant	921	General provisions covering building op- erations	782-832
Reformatory or Sheltering Institution	922	(Indexed also according to subject- matter.)	
Renderies	921	Girder:	
Rubber manufacture (from crude ma- terial)	921	Plate: Flanges—compression—stress webs	757
Sale, etc., stable.....	921	Reinforced concrete design	761
Saw or planing mill.....	921	Slow-burning construction: Require- ment	861
Seating structure (temporary.) Class IVd.	571	Glass, Wired: Use prescribed.....	459, 462 (c), 475 (b), 784
Second-hand store or yard.....	921	Grade of Street adjacent to Tenement House (Class VI): Determining factor	634 (i)
Shaving, sawdust and excelsior stor- age building	925	Grain Elevator: (See "Elevator [grain].")	
Shed (shelter) for coal, brick or ice purposes	876	Grandstand: Structural and other re- quirements	569-70
Sheet metal works.....	921	Gravel Roof: (See "Roof.")	
"Sheltering" Institutions	922	Gunpowder and Explosives: Construc- tion of Buildings.....	455
Shoddy manufacture or wood scouring.	921	Gutter—	
Shows, out-door exhibitions or special occasions	571	Requirement on buildings over 50 feet high	805
Size or gelatine manufactory.....	921	Wood support limitation in fireproof construction	859
Slaughter house	921	(See also Sec. 3014, Code 1922, as amended July 22, 1926.)	
Smelter	921	Habitable Room— H	
Smoke house (curing meats or fish) ..	921	Air—quantity provision	649
Soap factory	921	Altered room: Floor requirement— ceiling height (Class VI).....	678
Stable (more than five horses).....	927	Attic room: Requirement	647
Stable and barn.....	830 (b)	Basement or cellar (Class VI): When permitted	651, 679
Stable (boarding, livery or sale)	921	Definition: Structural requirement (Classes III and VI)	488
Starch factory	921	In a raised building.....	871
Steel or iron works.....	921	Minimum sizes (including attic): Re- quirement	647
Stock yards	921	New tenement (Class VI): Require- ment	650-1
Stone or monument works (run by machinery)	921	Pilasters, etc.: Limitation.....	648 (c)
Storage warehouses	921	Space under roof in fireproof construc- tion: Prohibited uses.....	858
Store (retail).....	926	Hall—	
Storing or bailing junk, scrap paper or rags	921	Assembly hall, Class IVb: Definition.	515
Tannery	921	Schools (assembly): Requirements..	700
Tar distillation or manufacture.....	921	Hall or Corridor. Definition (Class VI).	634 (f)
Tar roofing, Tar paper, or Tarred fab- ric manufactory	921		
Temporary seating structure (Class IVd)	571		
Textile factory or manufactory.....	921		
Turpentine or Oil manufactory.....	921		
Undertaking Establishments	931		
Varnish or Paint manufactory.....	921		
Wood or Bones, distillation: Place for Wood working establishment.....	921		
Wood scouring: Place for.....	921		
Yard (in connection with second-hand store)	921		
Frost: Protection of foundation against Furnaces (Warm Air Heating Plants). See ordinance governing installation at end of this Building ordinance.	742		
Furring: On brick wall—Requirement..	733 (c)		
Fuse Box—			
Class IVb: Requirement.....	536		
Class V: Requirement.....	624 (d)		
G			
Gable Roof. (See "Roof.")			
Gallery—			
Class IVb: Designation—exit and en- trance	524-5		
Class IVc: Limitation	548		
Class V: Designation	594 (b)		

Handrail Requirement—	
Class IVb	523
Class IVc	547
Class V	590, 613 (b)
Class VI	656, 664 (b)
Class VIII	701 (d)
Class IX	723, 880 (j)
Health, Dept. of: Jurisdiction in matters relating to location of boilers and to smoke inspection	803
Height—	
Building height determined by width of street (Class VI)	640
Determining factor as to fireproof or non-fireproof construction	453
Fireproof and non-fireproof structure (260 foot for fireproof)	812
Frame building outside fire limits: Restrictions	868 (b)
Limited to 260 feet from sidewalk level (fireproof buildings)	812
Roller coaster device	576
Story height determined by wall thickness	732 (n)
Structural limitations within and without fire limits	807
Towers, domes and spires: Limitation	806
Width of street determining factor (Class VI)	640
Height—When character of structure determines.	
Class I	453
Class I: (Increase in existing building)	461
Class IIa	472
Class IIb	474
Class IIc	478
Class III	485
Class IV	500
Class IVb	517
Class VI	610
Highway, Public: Encroachment upon—	
Restrictions	434, 436
Hip Roof. (See "Roof.")	
Hoists: Erection, etc., requirements	890, 896 (d)
(See also "Elevators.")	
Hoists: Use during building operations	896 (r)
Hollow Clay Building Tile	780 (a)
Hollow Wall; primary bearing	779
"Homes:" Regulations concerning	930
Horses: Stables and barns—Regulations concerning stabling, distance from school, church, hospital, public park or public playground	830 (c)
Hospital—	
Included in Class IIc and Class III.	
Note: Beds: Number in hospital determines class, i. e., more than 10, Class IIc, less than that number, Class III.	
Elevator (lift) requirement	481
Fire escape	482, 881 (r)
Frontage consents	479, 930
Garage (public): Distance regulation	929
Playground: Distance limitation. (See Code 1922.)	
Stables and barns: Distance, regulation	830 (c)
Tannery: Distance regulation	831
Hotel: Included in Class IIb.	
House of Correction: Included in Class IIc.	
House Moving—	
Brick: Requirements	728
Frame: Permit—frontage consent, etc.	923
Moving or tearing down by Fire Department	405
I	
Ice House: Structural requirement for storage house	877
Ice-making Plant—	
Church, hospital or school: Prohibited within 400 feet of. (See General Index, Code 1922.)	
Frontage consent requirement	932
Ice-making Machinery: Prohibited in theater building	626
Illuminated Roof Sign: Definition, construction, etc.	919
Imbecile, Infirm or Sick Institution Buildings: Included under Class II. (See also "Homes.")	
Isolated Wall or fence: Requirement ..	918
Inspection—	
Billboards and signboards (annual inspection)	913 (l)
Building Inspector in charge and assistants: Duties	418-19
Building Inspectors	420
Buildings: Several duties of Commissioner of Buildings and of Owners, etc.	445
Canopy or marquee	817
Curtain: Class V, hereafter erected ..	620
Elevator (lift) semi-annual	897
Elevator inspectors—duties	422-24
Fire escapes reported unsafe: Duty to inspect	402
Records to be kept	413
Roller coaster, scenic railway, etc.	577
Stairway and means of egress (in connection with inspection of buildings)	402, 445 (b)
Tenement (new)	637 (c) (d)
Unsafe or dangerous building, stairways, fire escapes, etc., in factory or workshop: Duty of Commissioner of Buildings where complaint is made.	402
Insulating Material for Metal Chimneys and Stacks	796
J	
Jail: Included in Class IIc.	
Joist:	
Class IIb, brick fire-stop between ..	475 (c)
Class III and VI: Support, requirement	730
Class VIII: Support requirement ..	732 (c)
General requirement as to Class I, II, IV, V, VII and VIII	733
L	
Lath—	
Metal (in conjunction with skeleton construction)	454 (a)
Partitions in Mill construction: Wood lath prohibited	864
Wallboard or plasterboard used in lieu of lath and plaster—when permitted.	819
Wood: Requirement	819
Wood lath prohibited (including studs and furring in mill construction) ..	864 (a)
Ledges: Joist support — corbelling (Classes I, II, IV, V, VII and VIII) ..	733
License issued in compliance with this Chapter: Revocation	583
Light Shaft: Class III (wholly within walls of two-story building): Requirement	491
Lighting Service Requirement—	
Class IVa	514
Class IVb	538
Class IVc	562-3
Class V	605, 627
Electric service cut-out box not to encroach on fireproof covering	851
Water closet requirement (Class VI) ..	671 (b)
Lintels	785 (b)
Livestock Runways: In rewood structure	807
Living Apartment in connection with Garage Building	456 (b)
(See also "Habitable Room.")	
Living Room in Basement, when permitted	679
Loads (live and dead)—	
Class I	454 (a), 465
Class II	469
Class III	487
Class IVa	507
Class IVb	522
Class IVd	568
Class V	589, 612

Class VII	694	Requirement, Class III	485 (b)
Class VIII	729	Requirement, Class IV	500
Class IX	(d) 717	Requirement, Class IVa	504 (a)
Design and structural detail for all buildings (with table).....	729	Requirement, Class IVb	517, 519
Eccentric loading to be provided for	731 (e), 754 (f)	Requirement, Class VII	683
Reinforced concrete construction: Test	778	Requirement, Class IX	716
Roof construction—allowance in addition to weight of structure and covering	729 (e)	Miscellaneous provisions covering building operations	782-832
Stairways in all classes: Requirement	729 (f)	Motion Picture Building—Included in Class I.	
Stress (general provisions).....	755	Amusement Park: Structure to comply with provisions of Class IVc....	574
Theaters (Class V): Requirements..	589	Film storage structure (including vault): Requirement	459
Timber piling (maximum).....	743 (e)	Motion Picture Theater: Included in Class IVc.	
Wall, pier and columns: Full live to be taken on in connection with roof.	731	Lighting requirement—Test of sufficient—Penalty	563
Wind resistance in relation to dead load	729 (b)	Test of sufficient—Penalty.....	563
Wood follower not to be used in determining safe load (pile foundation).....	743 (f)	Prohibited in frame building.....	545
Lodging or Rooming House: Included in Class IIc.		Motor Driven Vehicle Building: Requirement (Class I).....	456
Lot—		Moving a building, one location to another (brick, stone, frame or concrete): Alteration to conform, etc.....	728, 923
Alley or yard in rear of tenement house: Requirement.....	643	"Moving Picture Building," etc. (See "Motion Picture Building.")	
Building to be entirely within limits of lot, etc., unless by special permit....	434	Mallions: Fireproof Construction: Requirement	847
Class VI: Building requirements....	634	N	
Class VI: Distance between buildings on same lot—Provisions for one-story structures in rear.....	641	Noise of Building Operations at night (residential district), prohibited.....	829
Class VI: Percentage or area allowed to be covered.....	642	Nuisance—	
Corner lot defined.....	639	Building or structure maintained in violation of law.....	943
Frame building: Distance from line—Dimensions	488 (b), 874	Tenements (insanitary conditions)....	680
Front and rear occupation with buildings (Class VI): Restrictions.....	641	Theater above first floor.....	944
"Lot line court," "Court," "Inner" and "Outer" Court (Tenements): Definition.....	634 (d) 644	O	
Plat of portion to be occupied by building: Submission to Commissioner of Buildings	638	Obstruction: Street, Alley, etc.: Building, prohibited.....	434
Rear of tenement: Provision for one-story structures	641	Office Building: Included in Class IIa.	
M		Old People's Homes: Included in Classes IIc and III.	
Magnesia Block Insulation (metal chimneys)	796	Ordinances pertaining to Buildings: Power of Commissioner to pass upon.	401
Main Floor. (See "Floor.")		"Ordinary" Construction—	
Main Floor, Balcony and Gallery: Designation of each.....	594	Definition	866
Marquise (or Marquee.) (See "Canopy.")		Requirement, Class IIa	472 (c)
Mason Contractors: Regulations governing	899, 901-2	Requirement, Class IIb	475 (a)
Masonry—		Requirement, Class IIc	478 (a)
Allowable stresses on plain concrete and stone	746	Requirement, Class III	485 (c)
Definition of	747	Requirement, Class IVa	504
Halls in new non-fireproof tenement	655, 656	Requirement, Class IVc	545
Mechanical ventilation.....	470 (d)	Requirement, Class VII	683
Merchandise, Sale, Storage or Manufacturing Structure: Included in Class I.		Requirement, Class VIII	697 (b)
Metal or Metal-clad Door. (See "Door.")		Requirement, Class IX.....	716 (a)
Metal Frames, etc., and Fire-Resisting Glass: Claimants of superior construction and installation: Laboratory test—expense—authority to use....	784 (j)	Overturning Moment, Due to Wind Pressure: Not to exceed, etc.....	729 (b)
(See also Sec 835.)		P	
Metal Lath. (See "Lath.")		Pantry: Requirement (Class III).....	490
Metal Structural Roof Members: Omission of fireproofing—when allowed....	860	Parapet Wall: (See "Wall.")	
Metals: Tension, compression, bending, shear and bearing: Maximum allowable stresses (with table).....	754	Park or Playground (public): Stable or barn—Distance regulation	830 (c)
"Mill" Construction—		Partition—	
Definition: Requirement	863	Class I: (Film storage building)....	459
Fireproofing (partitions in mill construction)	864	Class I: (Occupied by more than one business)	462 (b)
Requirement, Class I.....	453 (b), 459	Class IIb:	475
Requirement, Class IIa	472 (b)	Class III: Requirement.....	488 (c)
Requirement, Class IIb	475	Class IVb: (Dressing room).....	542
Requirement, Class IIc	478 (a)	Class IVc: Dressing room.....	565
		Class V: (Dressing room).....	598, 628
		Class VI.....	653
		Eight-inch construction: Height limit	732 (d)
		Film storage structure: Requirement	459
		Fireproof construction	855-6
		Habitable room: Requirements.....	
		.....	488 (c), 647-651
		Mill construction: Requirement.....	864
		Slow-burning construction: Requirement	866

Smoke pipe passing through: Requirement	802	Plan—	Adequate drains to be provided for before issue of permit for building construction. (See General Index, Code 1922.)
Terra cotta, in fireproof construction: Requirement	844 (b)		Alteration on stamped plan not permitted without permission: Exception
(See also "Wall" under "Dividing.")			440
Party Wall. (See "Wall.")			Approval by officials other than Commissioner of Buildings
Penalty—			Billboards, signboards, etc.: Construction and repair
Billboards, etc.: Violation of governing provisions	916		909-10, 913
Building ordinance violation (general)	945		Canopy
General penalty for any violation of the Building Laws	945		Certification by architect or structural engineer
Illuminated roof signs: Violation of provisions governing	919 (f)		Class III: Partition plan to be filed, etc., prior to construction
Neglect of safety provisions for workmen	818 (g)		446 (c)
Permit—			Conformity with building law requisite: Architect's certificate
Application for by owner or agent	431		439, 446
Billboard and signboard construction or alteration	909-10, 913		Deviation: How dealt with
Boiler (steam)	803		447
Business of store in restricted district	927		Deviation from stamped plan: Requirement
Canopy	816		440
Change or alteration in tenement (Class VI)	636		Elevator (lift) construction: Requirement
Elevator (lift) construction	887		887 (b)
Erection, enlargement, alteration, repair or removal—voider provision	430		Essentials (scale to which drawn, distances and dimensions, lot lines, location of plumbing and certain signatures)
Fees for building permits	442		439
Fire escape erection	882 (b) (c)		Examination: Approval—Filing
Foundation encroachment into streets, etc.	436		413, 431, 432, 439
Frame building: Moving	923		Filing and return
Frame building: Raising	870		431
Issuance: Duty of Commissioner of Buildings	411		Foundation encroachment into street, etc., to be shown
Mezzanine or intermediate floor (Class VII)	687 (e)		434
Moving building (frame)	923		Illuminated roof sign
Partition in room in existing building: Requirement	488 (c)		919 (c)
(Class III)			Issuance of Permit
Raising frame building	870		433
Reports (daily) of permits issued	430 (a)		Mezzanine or intermediate floor: Requirement (including permit and plans), Class VII
Revocation and Re-issue	444		687 (e)
Roof: Change gable or hip to flat	870		On the job: To be kept
Shows, outdoor exhibitions, holiday occasions, etc.	571		438
Sidewalk and street obstruction (building construction) Revocation	828		Pile foundation: Requirement
Store (business of) in restricted district	927		743 (g)
Tank on roof	783		Plumbing to be shown
Tenement, change or alteration	636		439
Tenement—occupation	637		Reinforced concrete: Submission of plan—Detail—Test
Void if not used within six months after issuance	430		758
Withholding of building permit—protest of property-owners—public hearing	928		Retention by Commissioner after six months not obligatory
Wrecking building	443		431
Picture Machine Booth: Class IVc—Requirement	558		Roller coaster, scenic devices, etc.
Picture Machine Booth: Schools—When allowed	709		577 (a)
Piers—			Signing by licensed architect or licensed structural engineer required
Dead and live load requirement (with tables)	731		439
In connection with enclosing wall: Requirement	732 (j)		Structural engineer: Signature and seal
Isolated: Height prescribed unless, etc.—Weight computation	746 (f-g)		439
Pilaster—			Tenement and apartment house: Change or alteration. Requirement
Enclosing wall: Requirement	732 (i)		636
Habitable room: Requirement	648 (c)		Plasterboard. (See "Lath.")
Pile Foundation. (See "Foundation.")			Plastering: Requirement
Pipe—			819
Downspouts (water conductors): Requirement	805		Plate Girders: Provisions governing
Embedment in connection with fireproof construction	813 (b)		757
Fireproof construction: Not to be enclosed—Exception	813		Plumbing—
Pipes and Other Conveyors Passing from Floor to Floor: Enclosure requirements	844 (a)		Location to be shown on plan
Placards Indicating Floor Strength. (See "Floor.")			439
			Tenement house: Requirement
			671-3
			Police—
			Assist Commissioner of Buildings when called upon
			410
			Station buildings: Provisions governing
			714-724
			Porch—
			Construction inside fire limits
			782
			Prohibited as an encroachment on street. (See General Index, Code 1922.)
			Structural requirements
			661
			Portico Construction Inside Fire Limits.
			782
			Portland Cement: Prescribed use—Specifications and Tests to be along lines adopted by U. S. Govt.
			768
			Post (wood): Slow-burning construction: Requirement
			861
			Private Residence: Included in Class III.
			Private Stable. (See "Stables and Barns.")
			Projection of Cornice, Belt Courses over Street. (See "Cornice.")
			Projection of Foundation into Streets, Etc. (See "Foundation.")

Protection to Life and Property: Comr. Bldgs. empowered to prevent endangering	402-6
Protest of Property Owners against certain building permits—Public hearings	928
Provisions, General and Special: Conflict between—What governs.....	450
Public Hall: Definition.....	634 (f)
Public Highway or Ground: Prohibited erection or encroachment upon.....	434-436

R

Reception or Ante-room— Ventilation	470 (e 1), (e 2), (g 2, 3, & 4)
Red Light: Use during building operations	827 (b)
Reinforced Concrete Construction: Definition	758
Cement finish: Calculation.....	775
Cinder concrete: Prescribed uses....	780
Columns: Requirement.....	764
Concrete placed in freezing and in warm weather: Requirement.....	773-4
Curtain wall, skeleton construction: Requirement	766
Design for beams, girders and slabs....	761
"Destruction" test	762 (q)
Drenching with water.....	774
"Equally good" system; test provision	762 (q)
Fireproof construction: Requirement	776
Flat slab construction.....	760-763
Form filling around reinforcing steel: Requirement	772
Forms: Removal	777
Hollow tile construction in connection with reinforced concrete construction: Definition and provisions.....	779 (a)
Load test: Requirement.....	778
Mixing concrete: Requirement.....	771
Moments of external forces: Calculations	762
Portland cement only to be used: Test	768
Ratio of moduli of elasticity: Adhesion—Bond	759
Sand: Quality requirement.....	769
Slab construction: Calculation as to ribs, etc.	763
Steel used in: Bending and elongation requirements	767
Stone requirement	770
Stress (unit) for steel-and-concrete....	760
Test provision for "equally good" construction	762 (q)
Varying from design hereinbefore given	762 (q)
Reinforced Hollow Tile. (See "Reinforced Concrete Construction.") (See also "Terra Cotta Hollow Tile Construction.")	
Removal of Buildings: Brick, stone or frame (including tenements)	654, 728, 923
Fire Department to remove or tear down: When	405
Residence (private): Included in Class III.	
Revocation of Building or Wrecking Permit, for Cause.	444
Revolving Door: (See "Door.")	
Riveting: Tensions	756
Roller Coaster Device: Height restriction	576
Roller Coaster, Scenic Railway, Etc.: Certificate of test—Permit—Fee.....	577
Roof— Bulkhead, Class VI: Requirement....	663
Composition: Requirement	811
Construction requirement	810
Enclosures upon roof.....	809
Fireproof requirement	853
Frame building: Changing gable or hip to flat.....	870
Full live load to be taken on wall, pier and column	731
Gable or hip: Changing to flat roof (frame buildings): Requirement....	870
Gravel: Requirement	811

Housing (elevators, tanks, skylights, scuttles, etc.)	812 (d)
Load requirement in addition to its own weight	729 (e)
Over sidewalk during building construction	818
Pitch of	810
Shingle, gravel or composition: Requirement	811
Space under roof in fireproof construction: Prohibited uses.....	858
Structures upon (skylights, water tank and elevator machinery enclosures): Requirement	809, 812
Tank on roof: Permit—fee.....	783
Use of roof: When considered as story of building (Class IVd).....	572
Water from roof—how carried to ground	805 (c)
Room: Habitable. (See "Habitable Room.")	
"Rubble," defined	747 (b)
Rulings of Department of Buildings on Mooted Points. (See at end of Ordinance.)	
Runways or Viaducts for Live Stock: Provisions concerning wood structure.	807

S

Safety of Building or Part Thereof: Commissioner's decision final.....	409
Safety Devices: Elevator (lift)	895, 897
Floor (temporary during building operations)	818
Roller coaster.....	576, 577
Scaffold	818
Window cleaners	788
Sale Stables. (See "Stables and Barns.")	
Sand— Fireproof construction: Quality demanded	842 (b)
Reinforced concrete construction: Quality demanded	769
Scaffold or Temporary Floor: Requirement	818
Scenery— Class IVb: Definition—Fireproofing—Amount allowed	539-41
Class IVc: Stationary, etc.....	564
Class V: Framing	621
Class V: Definition and exceptions....	630
Class VIII: Restrictions	708
Note: See also Sec. 1337, Code 1922, as to Scenery (Fire Prevention).	
Schools— Garage (public) in relation to proximity to a school.....	929
Gas reservoir in relation to proximity to school	832
General provisions governing construction, etc.	695-713
Junk store or yard: Prohibited proximity to school: (See Section 3532, Code 1922.)	
Lighting (gas and electric) provision	707 (b)
Moving picture machines: Provision governing	709
Portable buildings of frame: Restrictions	699
Power of officials to close for violation of building provisions.....	713
Scenery and curtains: Provisions governing	708
School building: Included in Class VIII.	
Stables or barns, distance provision	830 (c)
Tannery, distance provision.....	831
Scuttles: Structure Above Roof.	812 (d)
Seats— Measurements: Class IVa	511
Class IVb	528
Class IVc	551
Class V	592, 614

Not fixed: Space computation:		Requirement, Class IIb....474 (b), 475 (a)	
Class IVa	513	Requirement, Class IIc	478 (a)
Class IVb	520	Requirement, Class III	485 (b)
Number in row and measurement:		Requirement, Class IV	500
Class IVa	511	Requirement, Class IVa	504
Class IVb	528	Requirement, Class IVb	517 (a), 519
Class IVc	551	Requirement, Class VI	652, 658 (a)
Class V	592, 614	Requirement, Class VII	683
Schools: Requirement as to seating..	700	Requirement, Class VIII	697 (c)
Temporary seating accommodations for outdoor occasions.....	571	Requirement, Class IX (Police Sta- tion)	716
Shaft—		Slow-burning, Fireproof Mill, and Ordinary Construction: Construction in relation to height (Class I).....	453
Area	645	Smoke Pipe: Passing through partition: Requirement	802
Definition	634 (e)	Smoking Meats or Fish: Structural re- quirement for building.....	457
Fireproof building enclosures—omis- sion	844 (d)	Soils: Foundation loads and other re- quirements	738-40, 742-3
Shear—		Special Provisions: To govern when in conflict with general provisions.....	450
Hollow tile (stress).....	779 (a)	Special Rulings of the Department of Buildings on Mooted Points in the Building Ordinance. See page.....	315
Rivets and pins, steel shapes, plate girders, webs and brackets.....	754 (a)	Spiral Stairs or Winders. ...667, 701 (d),	880 (k)
Shed—		Spires. See "Towers, Domes and Spires."	
Automobile: Requirement	456 (b)	Sprinkler System—	
Brick, cement, coal, salt and stone shed (open shelter) and sheds for icing cars: Requirement	876	Class I: Requirement	463 (b)
Fire Dept.: Sheds for storage of fuel and supply wagons.....	875 (d)	Class I: (Garage building).....	456 (a)
Garage of brick or frame: Require- ment	456	Class V	604, 625
Near navigable water or railroad tracks for storage	876	Class VII	684 (a-b)
Open shelter: Requirement.....	875	Elevator (lift) hoistways in non-fire- proof structures: Equipment.....	890
Prohibited for dwelling purposes or as an addition	875 (e)	In mill construction building.....	863
Sheet-metal Work: Support of in fire- proof construction	859	Square: Definition.....	928
Shelter Shed. (See "Shed.")		(See also the heading, "Block.")	
Shingle Roof. (See "Roof.")		Stables and Barns—	
Shows and Outdoor Entertainments:		Five hundred or more sq. ft. (Included in Class I.)	
Temporary seating structures: Re- quirement	571	Less than five hundred sq. ft. (In- cluded in Class III.)	
Sick, Infirm or Imbecile Persons: Build- ings for. (Included in Class II.)		Regulations: (Including floor con- struction, frontage consent, distance from school, church, hospital, public park or playground).....	830
Sidewalk: Roof over during building operations: Requirement	822	School, church, hospital, public park or public playground: Distance reg- ulation	830 (c)
(See also "Streets.")		Stack. (See "Chimney.")	
Sidewalk and Street: Occupation during building construction	820-828	Stadium (Enclosed)—	
(See also "Streets.")		Regulations governing	578 (a)
Sign—		Stage: Construction, Class V.....	601, 621
"Dangerous building": Requirement as to posting.....	403	Stair Hall: Definition	634 (g)
Illuminated roof signs: Definition and general requirements	919	Stairs and Stairways—	
Sign. (See also "Billboards and Sign- boards.")		Change in stairway or fire escape on approved plans only by permit.....	886
Signal Lights: Requirement as to street obstructions	827 (b)	Class I (garage)	456 (a-b)
Sill— Class III: Level allowed.....	492	Class III (hereafter erected).....	493
Door and window: Structural require- ment (except in Classes III and VI) ..	785	Class IVa	506-7
Sink: Class VI: Requirement.....	672	Class IVb	523, 529
Skating Rink: Included in Class IVb. Level above grade.....	521 (c)	Class IVc	547
Skeleton Construction:		Class V (now in existence).....	590
Term as applied and requirements....	781	Class V (hereafter erected).....	613
Skeleton Steel Construction—		Class VI	664-668
Curtain wall requirement.....	766	Class VII	690
Independent support	849	Class VIII	701, 702
Skeleton Steel Wall. (See "Wall.")		Class IX (Police Stations).....	722
Skewback: Requirement	852 (c-d)	Garage: Living room connection with ground	456 (b)
Skylights—		General provisions covering construc- tion in ordinary, mill, slow-burning and fireproof building (Classes I, II and VII).....	857, 862, 865, 878-80
Class III: Construction requirement..	486	Housing on Roof: Stair provision.....	812 (d)
Class VI: Construction requirement..	646	In frame building, where divided by fire wall or walls.....	874
Class VIII: Construction requirement..	707	Inspection requirement	445
General: Construction requirement....	808-9, 812	Live load requirement in buildings of all classes	729 (f)
Slabs: Reinforced concrete design....	761-2	Schools: Requirements.....	701, 702
Sleeping Porch. (See "Porch.")		Spiral stairs (and winders) 667, 701,	880 (k)
Sleeping Stalls in Rooms, when allowed. 476		Sub-basement or cellar: Leading to or from	814
Slow-burning Construction—		Standpipe and Hose on Stage: Require- ment, Class IVb and Class IVc....	534, 559
Definition and requirements.....	860-2		
Requirement, Class I.....	453 (b)		
Requirement, Class IIa.....	472 (b)		

Steel—		
Bending and elongation: Conformation to requirements.....	767	
Columns: When used in connection with reinforced concrete work.....	765	
"T" Beams: Width of flange in connection with reinforced concrete work	763	
Steel Rails or Beams Used in Foundations. (See "Foundations.")		
Stone:		
Fireproof construction: Quality demanded	842 (c)	
Reinforced concrete construction: Quality demanded	770	
Stone Building: Requirement as to moving	728	
Stoppage of Construction or Wrecking When in Violation of Law.....	406	
Storage Structures—		
Requirement for		
Acetylene gas	455 (b)	
Automobile	456 (a-b)	
Dry cleaning	458	
Film (moving picture)	459	
Fireworks and Explosives.....	455 (a)	
Grain elevator	466	
Shavings, sawdust, etc.	925	
Sheds (when used for storage).....	876	
Store—		
Business of, in restricted district: Permit requirement	927	
Store front: Structural requirement (Classes III and VI excepted).....	785	
Store (other than "Department" Store). Included in Class I.		
Stories, numbering of.....	689	
Story: Definition	634 (j)	
Street Frontage—		
Tenement and apartment house: "Corner lot" computation in relation to "lesser" frontage	639	
(See also "Exposure.")		
Towers, domes and spires: Construction based on street frontage.....	806	
Street Frontages: (See "Exposure.")		
Street and Sidewalk: Occupation during building construction	820-8	
Streets—		
Occupation during building operations	820-8	
Public highway or public ground: encroachment prohibited—exception	434, 436	
Red lantern display.....	827	
Signal lights: Requirement.....	827	
Stress—		
Beams, trusses and girders (metal)...	754	
Columns (steel).....	765	
Eccentric loading to be provided for, etc.	731 (e), 754 (f)	
Foundations	738	
Girders (plate)	757	
Grain bin, elevator, warehouse (terra cotta tile)	779 (f)	
Hollow tile columns.....	779 (a)	
Live and dead load (general provisions)	755	
Masonry foundation	746	
Metals: Maximum allowable stresses and special requirements.....	754	
Steel-and-concrete (unit)	760	
Steel used in reinforced concrete: Bending and elongation requirements	767 (b)	
Structural steel columns.....	765	
Terra cotta hollow tile construction: Tile and tile columns.....	779 (a-c)	
Timber	752	
Walls, piers and columns.....	731 (d)	
Structural Detail—Requirements.....	725-757	
Structural Engineer: Signature and seal on plans	432	
Structural Limitations Within and Without Fire Limits.....	807	
Structure Over Ceiling: Construction—		
Class IVb: Requirement.....	533	
Class IVc: Requirement	557	
Class V: Requirement (hereafter erected)	623	
Class VI: Requirement	658	
Struts for Windbracing: Least radius of gyration	754 (g)	
Sub-basement. (See "Basement.")		
T		
"T" Beams: Width of flange in connection with reinforced concrete construction	763	
Tank—		
Roof: Permit—Fee	442 (c), 783	
Tannery: Location limitation.....	831	
Temporary Floor or Scaffold: Requirement	818	
Temporary Seating Structures (Shows and Outdoor Entertainments): Requirement	571	
Tenement and Apartment House—		
Definition and class.....	632, 634 (a)	
Access to room: Requirement.....	670	
Addition to frame within fire limits prohibited	654	
Additional room or hall: Compliance with law	676	
Air: Quantity requirement.....	649	
Alcove: Definition—Requirement	648	
Alley or yard in rear: Requirement	643	
Apartments to be divided by masonry wall	657	
Area allowed to be covered.....	642	
Attic room: Requirement.....	647 (b)	
Basement living rooms: When permitted	651, 679	
Bath, etc., room. Window area.....	650	
Bay window, court and shaft: Wall material	660	
Bulkhead in roof: When required....	663	
Ceiling over stores (new non-fireproof tenement): Requirement	658	
Cellar. (See "Basement, etc." (above). Certificate prior to occupancy (new tenement).....	637	
Change or alteration: Permit—Plan..	636	
Class VI: Provisions to govern in case of conflict of sections.....	635	
Court and shaft: Enclosing wall support	658	
Courts: Inner and outer—Minimum widths—Lot line passages and courts	644	
Distance between buildings...488 (b),	641	
Drainage of courts and shafts.....	669	
Entrance hall (new tenement): Masonry and wall requirement.....	655-6	
Existing building moved: Character of foundation	654	
Existing buildings exempt from provisions of this Article except, etc....	675	
Fire, etc., damage: Rebuilding or repair: Concerning.....	674	
Fire escape provisions.....	668	
Fireproof and slow-burning construction (new tenement): Determined by height	652, 658	
Flue and chimney requirement.....	662	
Foundation required for moved structure	654	
Foundation requirement for story or basement	679 (b)	
Foundation walls (new tenement): Material—Dimension—Dampproofing	659	
Frame: Addition within fire limits prohibited	654	
Frame apartment: Incombustible partitions	653	
Habitable rooms in basement: Requirement as to use.....	651, 679	
Habitableness: Certificate necessary prior to occupation of new tenement	637	
Halls: Requirements	655, 656	
Height, as determining character of construction	652	
Height: How determined by width of street	640	
Inspection of new tenement as work progresses: Certificate—violation.....	637 (b-c-d)	
Lighting requirements.....	650	
Lot area: Percentage of occupation....	642	
Lot frontage: What constitutes.....	639	

Masonry dividing walls.....	657	Timber—	
Metal lath, etc., requirement in ordinary construction.....	657 (b)	Columns: Limitation as to use.....	752
Moved from one lot to another: Basement or story in new location: Requirement.....	679 (b)	Quality prescribed.....	753
Moving of existing building: Character of foundation.....	654	Stress allowance (with table): Maximum length.....	752
New tenement: Certificate of habitableness.....	637	Tin-clad Door. (See "Door.")	
Nuisance: What constitutes.....	680	Towers, Domes and Spires: Requirements	806
Occupation of part before completion: Requirement.....	637 (b)	Trusses, Columns, Walls, Etc., in Steel Skeleton Construction: Bracing requirement	781
Pantry room: Window area.....	650	Tunnels: Theater construction	593
Partitions in frame (outside fire limits): Incombustible construction.....	653		
Plat of lot, etc.: Submission prior to obtaining permit to build, etc.....	638	U	
Plumbing requirements.....	671-3	Unclassified Building. See the heading, "Building."	
Porch: Requirement.....	661	Unsafe Building: See the heading "Building."	
Room: Alteration must conform to certain floor and window area.....	677-8		
Room and hall in tenement hereafter constructed in existing structure: Requirement.....	676	V	
Rooms: Size—Height—Attic room—Window required in sub-divided room	647	Vaudeville Theater: Included in Class IV and Class V.	
Scuttle in roof: Requirement.....	800	Vault: Film storage (motion picture): Requirement.....	459
Skylight: Requirement.....	646 (a), (c)	Veneer (Brick). See "Brick."	
Slow-burning: Requirements.....	652, 658	Vent or Flue Over Stage: Requirement—	
Stair hall and stairway requirements.....	646 (a) (c), 656, 664-7	Class IVb.....	535
Story or basement—wall requirement.....	679 (b)	Class IVc.....	560
Vent shafts.....	645, 658, 660, 669	Class V.....	603, 624
Ventilation.....	650	Ventilation:	
Water closet requirement.....	671	Air requirement in tenement room (Class VI).....	649
Wood supports under moved tenement prohibited.....	654	Attic: Class VI.....	678
Tension of Rivets.	752	Buildings: (See under Chap. XXXIX, Art. XXXV, Sections 2152-3-4 of Code 1922, Passed Jan. 5, 1929, pages 4244-4246).	
Terra Cotta Hollow Tile Construction—		Class II: Requirement.....	470
Definition and requirements.....	779 (a), 844 (b)	Class III: Requirement.....	488
Theater—		Class VI: Requirement.....	649, 678
Above first floor level declared a nuisance: Exception.....	944	Reception and Ante-room.....	470
Aisles etc.: Obstructions in, prohibited.....	940	Room: Altered, etc., Class VI.....	677-8
Built in conjunction with other than Class V, to be fireproof.....	611	Sleeping stalls in rooms: Air requirement per person.....	476
Capacity (number of persons) allowed: Commissioner of Buildings to certify, etc.....	537, 561, 606, 629	Theater dressing room:	
Changing existing Class IV to Class V structure: Requirement.....	631	Class IVb.....	542
Class IV, IVb and IVc: General requirements.....	495-566	Class IVc.....	565
Class V: General requirements.....	579-583	Class V.....	598, 628
Class V: Now in existence.....	584-607	Vent shafts (solely for water closet, bath room or pantry):	
Class V: Hereafter erected.....	609-631	Class III.....	490
Closing by authorities.....	498, 582	Class VI.....	645, 671
Exits (emergency) Classes IVa, b, c, and V.....	512, 529, 552, 599	Class VI (wall construction).....	660 (b)
Exposure (street frontage): Requirement.....	502-3, 516, 544, 610 (a)	General construction requirement (except Class III).....	787
First Class: Included in Class V.		Wall forming ventilating duct: Requirement.....	801
Frame building: Prohibited in (note exception in 607).....	499, 545, 607	Water closet.....	671 (b)
Hall used for theatrical purposes in existing buildings. Included in Class IVb.		Window and floor area of room or attic: Class VI.....	677-8
Ice making machinery or ammonia apparatus prohibited in building.....	626	Window and mechanical ventilation (Class II) (Jurisdiction transferred to Dept. of Health).....	470
License, cause for revocation.....	583	Veranda Construction Inside Fire Limits	782
Moving picture structure within amusement park: Compliance with Class IVc provisions.....	574 (c)	Vestibule: Class V—For stage door.....	602, 622
Moving picture and vaudeville (not exceeding 300 seats): Included in Class IVc.		Viaducts or Runways for Live Stock: Requirements.....	807
Obstructions in aisles, etc., prohibited	940	Violations of Building Law: Record of complaints	413
Prohibited in frame building (exception to be found in 607).....	499, 545, 607	Volume: In relation to towers, domes and spires.....	806
Scenery—Definition, etc.—Exceptions..	830	Wall—	
Street frontage requirement. See "Exposure," above.		Altered building: Increase in thickness—requirement.....	734
Tunnels in cross aisles.....	593	Anchorage.....	732 (1)
Tile—		Area division (buildings for explosives and housing motor driven vehicles).....	455 (a), 456
Hollow clay building.....	780 (a)	Area division (ordinary construction), Class I.....	463
		Ash and rubbish chute: Wall forming—requirement.....	801
		Ashtar facing: When part of masonry wall.....	748
		Basement: Requirement—Class VI.....	659
		Basement of frame building: Requirement.....	872
		Bracing during erection.....	736
		Brick on wooden sills (Class III) level of sills.....	499

Building converted into flats: Division wall requirement	869
Class I: Requirements	454-9, 463
Class II: Requirements	475
Class III: Requirements	732 (q)
Class IV: Requirements	517, 531, 554
Class V: Requirements	600, 609, 620
Class VI: Requirements	658-9
Class VIII: Requirements	732 (c)
Clay tile or hollow concrete block allowed—when	732 (q)
Concrete (hollow) block, or hollow clay tile (Classes III and VI): When allowed	732 (q)
Corrugated iron: When allowed as enclosing wall	454 (b)
Court, light shaft and light court: Structural requirement	786-7
Curtain: Skeleton construction—requirement	766
Curtain wall of tile construction (subject to Sec. 779)	732 (p)
Dead and live load requirement (with tables)	731
Definition of "primary bearing" in terra cotta tile construction	779 (e)
Definition of terms used in construction	747
Dividing: Character and construction of incombustible doors	789
Dividing: When required	463
During construction: Height allowed in comparison to other walls of same building	736
Enclosing: Basement to sixteenth story—Requirements (with table) ..	732
Enclosing, built not less than fifty feet from any lot, etc.: Corrugated iron construction	454 (b)
Enclosing (miscellaneous provisions) ..	807
Facing support in fireproof construction	850
Fire wall in buildings occupied by more than one firm, etc.: Class I—Requirement	462
Fireproof construction: Independent support of skeleton	849
Forming smoke flue: Requirement ..	800
Foundation: Projection into public streets	434, 436
Frame building where changed into flats: Incombustible construction ..	869
Garage: Dividing—Openings—Door protection: Class I	456
Increase in thickness in new and old: Requirement as to foundation	742
Independent (F. P. Construction): Support requirement	849
Interior brick used to support fireproof floor: Requirement	732 (r)
Isolated wall or fence: Requirement ..	918
Length: Computation and measurement	732 (i)
New and old: Foundation requirements (general provisions)	742
Parapet: Structural requirement—when dispensed with	737
Party: Application of provisions of Section 734 in certain cases	735
"Primary bearing": Definition in connection with terra cotta construction	779 (e)
Proscenium, Class V	600, 620
Skeleton steel: Class I: Requirement	454-9
Skeleton steel: Curtain wall requirement	766
Skeleton steel: Enclosing wall requirement	837
Smoke flue: Requirement	800
Structural detail (including strength test)	730
Structural requirement in conjunction with buttresses, piers or pilasters	732 (j)
Terra cotta hollow tile: Requirement	779 (e)
Ventilating duct: Wall forming	801
Walls, piers and columns: Provisions relating to (with tables)	732
Wind pressuré:	
Class I: Requirement	454 (a)
Designs: Requirement	729 (b)
Isolated wall or fence: Requirement	918
Requirement as to certain structures	807
Window openings in nearness to lot line, etc. (Class VIII)	698
Wallboard and Plasterboard. (See "Lath.")	
Walls, Piers and Columns: Provisions relating to (with tables)	732
Warehouse (grain): Tile (Hollow) construction	779 (f)
Warm Air Heating Plants: Ordinance governing installation. See at end of this Building ordinance.	
Water: Use of during building construction	441
Water Closets and Urinals—	
Class III: Requirement	490
Class VI: Requirement	650, 671
Water Table. See "Cornice."	
Water Tank Enclosure on Roof. See "Roof."	
Wind Pressure or Resistance—	
Billboards, etc.	911
Class I: Requirement	454 (a)
Designs for all buildings to include provisions for	729 (b)
Fence or isolated wall	918
Requirement as to certain structures.	807
Winders or Spiral Stairs ..667, 701 (d),	880 (k)
Window—	
Casement: Requirement	784 (g)
Class I: Metal frame and wired glass requirement	459, 462 (c)
Class III: Area in habitable room	488 (b)
Class VI: Area in habitable room	650 (a)
Class VI: Area in altered room	677
Court and light shaft: Construction requirement	786
Distance above floor, Class III	488 (b)
Garage: Metal framing	456
Metal frame: Reinforcement	784 (h)
Metal frames and sash and wired glass: Requirement	784 (c)
Motion picture film building requirement	459
Opening: Protection in Classes I, II, IV, V, VII and VIII	784 (a)
Prism glass in lieu of wired glass	784 (i)
Safety device for cleaners	788
Sash (metal): Requirement ..784 (d e f g)	
Ventilation	470
Tenement: Requirement	650
Water closet: Class III	490
Water closet: Class VI ..650 (b), 671 (b)	
Wired glass (metal framed)	459, 462 (c), 475 (b), 784
Window and Mechanical Ventilation. (See "Ventilation.")	
Wired Glass: Requirement	459, 462, 475 (b), 784, 787 (d)
Wood Lath. See "Lath."	
Work—	
Not to begin until, etc.	447 (c)
Power to stop	447 (b)
Workmen: Comfort and safety provisions—	
Elevator (lift) device	895
Floor (temporary)	818
Scaffolds	818
Window cleaners	788
Wrecking—	
Permit: Fee—Bond	443
Revocation of permit	444
Unsafe building: Authority to direct Fire Department to tear down	405
Violation of law: Notice to owner—	
Power of Commissioner	404-406
Yard—	
Defined	634 (c)
Rear of tenement: Alley or yard required	643
Zoning—	
Appointment of Commission on. See page 331.	
Residence districts: Temporary withholding of permits for certain buildings. (See page 333.)	
Note: For amendments to "Use" and "Volume" Districts maps, consult Journal of Council Proceedings.	

BUILDING ORDINANCE

OF THE CITY OF CHICAGO

Revised Code of 1922

Comprising Chapter XVII, Sections 396 to 945 of the Chicago Code of 1922.
With Amendments up to and including July 10, 1929.

Attention is directed to the numerous Special Rulings of the Department of Buildings on certain sections in the Building Ordinance and which follow at the end thereof.

Attention is likewise directed to the Chicago Zoning Ordinance which follows immediately after the Special Rulings.

To eliminate obscurity in the meaning of the ordinances, a plan of illustrating the difficult passages by means of illustrative diagrams has been adopted with the approval of the Commissioner of Buildings. All diagrams used, have been submitted to the commissioner to determine their correctness of interpretation and are published with his sanction.

The illustrative drawings and diagrams with their description and arrangement are copyrighted and the system protected and all rights are reserved in this as well as other cities of the United States.

The Building Ordinance of the City of Chicago is now in process of revision. We are advised by those in charge that it may require a year or more to complete the work.

In the event that the revised Building Ordinance is completed before the anticipated time, a supplement containing same will be sent to the users of the "Handbook for Architects and Builders."

Following the Building Ordinance will be found an ordinance governing structures or space for housing motor vehicles belonging to occupants of fireproof apartment hotels and apartment buildings (passed June 20, 1928), and an ordinance governing the installation of Warm Air Heating Plants.

(Copyright, 1929, by H. L. Palmer.)

CHAPTER XVII.

Buildings.

ARTICLE I.

396. Department of Buildings Established—Officers.) There is hereby established an executive department of the municipal government of the City of Chicago which shall be known as the Department of Buildings and which shall embrace a Commissioner of Buildings, a Deputy Commissioner of Buildings, a Building Inspector in charge, an Elevator Inspector in charge, a Secretary of the Department of Buildings and such number of assistant Building Inspectors in charge, Building Inspectors, Elevator Inspectors, and such other officers, assistants and employees as may be from time to time provided for in the annual appropriation ordinance.

397. Building Commissioner—Appointment Bond.) There is hereby created the office of Commissioner of Buildings. He shall be the head of said department of buildings and shall be an experienced architect, or a civil, structural or architectural engineer or a building contractor or an efficient building mechanic and shall have been engaged as an architect or a civil, structural or architectural engineer or building contractor or building mechanic for a period of not less than ten years prior to his appointment. During his term of office as Commissioner of Buildings he shall not be engaged in any other business.

He shall be appointed by the Mayor, by and with the advice and consent of the City Council.

The Commissioner of Buildings before entering upon the duties of his office shall execute a bond to the city in the sum of twenty-five thousand dollars, with such sureties as the City Council shall approve, conditioned for the faithful performance of his duties as the Commissioner of Buildings.

398. Other Offices.) There are hereby created the offices of Deputy Commissioner of Buildings, Engineer in Charge, Building Inspector in charge, Elevator Inspector in charge, Fire Escape Inspector in charge, Secretary to the Commissioner of Buildings,

Assistant Engineer in charge and the officers of such number of Assistant Building Inspectors in charge, Building Inspectors, Elevator Inspectors and Fire Escape Inspectors as may from time to time be provided for in the annual appropriation ordinance. The incumbents of these offices shall be known and designated by their respective titles as herein set forth.

399. Appointment of Subordinates—Duties of Commissioner.) (a) The Commissioner of Buildings shall have the management and control of all matters and things pertaining to the department of buildings, and shall appoint, and may remove according to law, all subordinate officers and assistants in his department. All subordinate officers, assistants, clerks and employes in said department shall be subject to such rules and regulations as shall be prescribed from time to time by said Commissioner.

(b) The Commissioner of Buildings shall institute such measures and prescribe such rules and regulations for the control and guidance of his subordinate officers and employes as shall secure the careful inspection of all buildings while in process of construction, alteration, repair or removal and the strict enforcement of the several provisions of this chapter.

(c) It shall be the duty of said commissioner and his assistants to enforce all ordinances relating to the erection, construction, alteration, repair, removal or the safety of buildings.

400. Personal Liability.) In all cases where any action is taken by the Commissioner of Buildings to enforce the provisions of any of the sections contained in this chapter or to enforce the provisions of any of the building ordinances of the city now or at any time hereafter in force, whether such action is taken in pursuance of the express provisions of such sections or ordinances or in a case where discretionary power is given by the ordinances of said city to the Commissioner of Buildings, such acts shall be done in the name of and on behalf of the City of Chicago, and the said Commissioner of Buildings in so acting for the city shall not render himself liable personally, and he is hereby relieved from

all personal liability, for any damage that may accrue to persons or property as a result of any such act permitted in good faith in the discharge of his duties, and any suit brought against the said Commissioner of Buildings by reason thereof shall be defended by the Department of Law of said city until the final termination of the proceedings therein.

401. Power to Pass On Ordinances.) The Commissioner of Buildings shall have full power to pass upon any question arising under the provisions of this chapter, subject to the conditions, modifications and limitations contained therein.

402. Inspection of Buildings or Structures Where Complaint is Made—Duty of Commissioner—Unlawful to Continue Use of Buildings Not in Compliance with Ordinances.) It shall be the duty of the Commissioner of Buildings where any citizen represents that any building or structure or part thereof is in an unsafe or dangerous condition, or that the stairways, corridors, exits or fire escapes in any factory or workshop or other place of employment are insufficient for the escape of employes in case of fire, panic or accident, or that the stairways, exits and fire escapes of any building or structure in the city do not comply with the requirements of this chapter to make an examination of such building or structure, and if such representation is found to be true the said Commissioner shall give notice in writing to the owner, occupant, lessee or person in possession, charge or control of such building or structure to make such changes, alterations or repairs as safety or the ordinances of the city may require. Upon failure of parties so notified to comply with the requirements of said notice the matter shall be placed in the Department of Law of the City of Chicago for prosecution.

It shall be unlawful to continue the use of such buildings until the changes, alterations or repairs found necessary by the Commissioner of Buildings to make such building or part thereof safe or to bring it into compliance with this Chapter, shall have been made.

403. Buildings Found in Unsafe Condition—Notice to Owner—Authority of Commissioner.) (a) Whenever the Commissioner of Buildings shall find any building, or structure or part thereof in the city in such an unsafe condition as to endanger life, but in such condition that by the immediate application of precautionary measures such danger may be averted, he shall have authority, and it shall be his duty, to forthwith notify, in writing, the owner, agent or person in possession, charge or control of such building or structure or part thereof, to adopt and put into effect such precautionary measures as may be necessary or advisable in order to place such building or structure or part thereof in a safe condition; such notice shall state briefly the nature of the work required to be done and shall specify the time within which the work required to be done shall be completed by the person, firm or corporation notified, which shall be fixed by said Commissioner of Buildings, upon taking into consideration the condition of such building or structure or part thereof, and the danger to life or property which may result from its unsafe condition.

(b) Whenever such Commissioner of Buildings shall be unable to find the owner of such building, structure or part thereof, or any agent or person in possession, charge or control thereof, upon whom such notice may be served, he shall address, stamp and mail such notice to such person or persons at their last known address, and in addition thereto shall place or cause to be placed the notice herein provided for upon such building at or near its principal entrance, and shall also post or cause to be posted in

a conspicuous place at each entrance to such building, in large letters, a notice as follows:

"THIS BUILDING IS IN A DANGEROUS CONDITION AND HAS BEEN CONDEMNED BY THE COMMISSIONER OF BUILDINGS."

(c) It shall be unlawful for any person, firm or corporation to remove said notice or notices without written permission from the Commissioner of Buildings.

(d) If at the expiration of the time specified in such notice for the completion of the work required to be done by the terms of such notice, in order to render the building or structure safe, said notice shall not have been complied with, and said building or structure is in such an unsafe condition as to endanger life or property, it shall be the duty of the Commissioner of Buildings to proceed forthwith to tear down or destroy that part of said building or structure that is in such unsafe condition **as to endanger life or property, and in cases where an unsafe building or structure cannot be repaired or rendered safe by the application of precautionary measures, such building or structure, or the dangerous parts thereof, shall be torn down by said Commissioner of Buildings or by his order and the expense of tearing down any part of such building or structure shall be charged to the person owning or in possession, charge or control of such building or structure or part thereof, and the said commissioner shall recover or cause to be recovered from such owner or person in possession, charge or control thereof the cost of doing such work, by legal proceedings prosecuted by the Law Department.**

(e) If the owner, agent or person in possession, charge or control of such building or structure, or part thereof, when so notified, shall fail, neglect or refuse to place such building or structure, or part thereof, in a safe condition, and to adopt such precautionary measures as shall have been specified by said commissioner within the time specified in such notice, in such case, at the expiration of such time it shall be unlawful for any person, firm or corporation to occupy or use said building or structure, or any part thereof, until said building or structure or part thereof is placed in a safe condition; and in case where a building or structure, or part thereof, is in a dangerous or unsafe condition and has not been placed in a safe condition within the time specified in the notice of the Commissioner of Buildings, such building or structure, or such part thereof, shall be forthwith vacated, and it shall be unlawful for any person or persons to enter same except for the purpose of making repairs required by the Commissioner of Buildings and the ordinances of the City of Chicago.

404. Building or Part of Building Constructed or Being Constructed in Violation of Chapter—Authority of Commissioner to Tear Down.) (a) Whenever it shall be found that any building or structure, or part thereof, is being, or shall have been constructed or built in violation of any of the provisions of this chapter, the Commissioner of Buildings shall forthwith notify the owner, agent, superintendent or architect of, or the contractor engaged in erecting such building or structure, or part thereof, of the fact that such building or structure, or part thereof, has been, or is being, constructed or erected contrary to the provisions of this chapter and shall specify briefly in such notice in what manner the provisions of this chapter or any of them, have been violated, and shall require the person so notified to forthwith make such building, structure, or part thereof, conform to and comply with the provisions of this chapter, specifying in

such notice the time within which such work shall be done.

(b) If, at the expiration of the time set forth in such notice, the person so notified shall have refused, neglected or failed to comply with the request made in such notice and to have such building or structure, or part thereof, concerning which notice was sent, changed so as to conform to and comply with the provisions of this chapter, the Commissioner of Buildings shall have the authority, and it shall be his duty to proceed forthwith to tear down or cause to be torn down such building or structure, or such part thereof as shall or may have been erected and constructed in violation of any of the provisions of this chapter, and the cost of such work shall be charged to and recovered from the owner of such building or structure or from the person for whom such building of structure is being erected, in legal proceedings prosecuted by the Department of Law.

405. May Direct Fire Department to Remove.) The Commissioner of Buildings shall have authority to direct the Fire Commissioner to tear down any defective or dangerous wall or structure or any building or structure or part thereof which may be constructed in violation of the terms of this chapter, after written notice has been served upon the owner, lessee, occupant, agent or person in possession, charge or control, directing him or them to tear down or remove any defective wall, building or structure, or any part thereof, which is in a dangerous condition, which has been, or is being, constructed or maintained in violation of the terms of this chapter. In case of the destruction or partial destruction of buildings by fire, decay or otherwise, when any department of the city government, pursuant to the ordinances of the city, shall make an outlay of money or incur any liability for the payment of any expense on behalf of the city in an effort to preserve or prevent the destruction of such building or buildings, or structure, or for the preservation of life of its citizens, it shall be the duty of the Commissioner of Buildings to ascertain the amount of such outlay or expenditure and present a bill therefor to the owner or owners of any such building or buildings, or its or their agent or agents, and it shall be the duty of said Commissioner of Buildings to refuse to issue a permit for the construction, re-construction, alteration or repair of any building or buildings or structure by any such owner or owners, lessee, occupant, agent or person in possession, charge or control thereof until such outlay or expenditure shall be repaid to the city by the owner, lessee, occupant, agent or person in possession, charge or control of such building or buildings thus totally or partially destroyed in the manner aforesaid. Said commissioner shall also proceed forthwith to collect the amount of such bill from such owner or owners, by legal proceedings prosecuted by the Department of Law.

406. May Stop Construction and Wrecking of Buildings.) (a) Said commissioner shall have power to stop the construction of any building or the making of any alterations or repairs of any building within said city when the same is being done in a reckless or careless manner, or with defective material, or in violation of any ordinance, and to order, in writing or by parol, any and all persons in any way or manner whatever engaged in so constructing, altering or repairing any such building, to stop and desist therefrom.

(b) And the said commissioner shall have power to stop the wrecking or tearing down of any building or structure within said city when the same is being done in a reckless or careless manner or in violation

of any ordinance or in such a manner as to endanger life or property, and to order any and all persons engaged in said work to stop and desist therefrom. When such work has been stopped by the order of said commissioner, it shall not be resumed until said commissioner shall be satisfied that adequate precautions will be taken for the protection of life and property, and that said work will be prosecuted carefully and in conformity with the ordinances of the city.

407. Arbitration—Appeal from Decision.) (a) In all cases where discretionary power is given to the Commissioner of Buildings to estimate damage to buildings, as also in questions relating to the security of any building or buildings or structures, or part thereof, and in all other cases where discretionary powers are given by ordinance to the Commissioner of Buildings, any party or parties believing themselves injured or wronged by the decision of the Commissioner of Buildings may before instituting any suit, make an appeal for arbitration as follows, to-wit:

(b) Any person wishing to make an appeal shall do so within five days after written notice of the decision or order of the Commissioner of Buildings has been given. An appeal made later than five days after the serving of the notice of the Commissioner of Buildings shall not entitle the appellant to any arbitration. The request for arbitration shall be in writing and shall state the object of the proposed arbitration and the name of the person who is to represent the appellant as arbitrator.

(c) The Commissioner of Buildings shall thereupon inform the appellant of the cost of such arbitration and such appellant shall, within twenty-four hours from the receipt of such information, deposit with the Commissioner of Buildings the sum of money requested for defraying the expense of the same, which sum shall be fixed in each case by said commissioner in proportion to the time it will take and the difficulty and importance of the case, but shall in no case be more than the cost of similar service in the course of ordinary business of private individuals or corporations. As soon as such sum of money shall have been deposited with him, the Commissioner of Buildings shall appoint an arbitrator to represent the city and the two arbitrators thus chosen shall, if they cannot agree, select a third arbitrator, and the decision of any two of these arbitrators shall, after investigation and consideration of the matter in question, be final and binding upon the appellant as well as the city unless an appeal is taken therefrom, as provided in case of an appeal under a statutory arbitration, within five days thereafter.

408. Arbitrators to Take Oath—Power to Examine Witnesses.) The arbitrators shall themselves, before entering upon the discharge of their duties, be placed under oath by the City Clerk, to the effect that they are unprejudiced as to the matter in question and that they will faithfully discharge the duties of their position. They shall have the power to call witnesses and place them under oath, and their decision or award shall be rendered in writing, both to the Commissioner of Buildings and to the appellant. The fee deposited by the appellant with the Commissioner of Buildings shall be paid by the Commissioner of Buildings to the arbitrators upon the rendering of their report and shall be in full of all costs incident to the arbitration; but should the decision of said board of arbitration be rendered against the Commissioner of Buildings, then the money deposited by the aforesaid appellant shall be returned to him and the entire cost of such arbitration shall be paid by the city.

409. In Urgent Cases—Commissioner's Power Final.) Whenever the decision of the Commissioner of Buildings upon the safety of any building or any part thereof is made in a case which is so urgent that failure to properly carry out his orders to demolish or strengthen such building or part thereof may endanger life and limb, the decision and order of the Commissioner of Buildings shall be absolute and final.

410. Duty of Police to Assist Commissioner in Enforcing Provisions of this Chapter.) Whenever it shall be necessary, in the opinion of the Commissioner of Buildings, to call upon the Department of Police for aid or assistance in carrying out or enforcing any of the provisions of this chapter, he shall have the authority so to do, and it shall be the duty of the Department of Police, or of any member of said department, when called upon by said commissioner, to act according to the instructions of, and to perform such duties as may be required by said commissioner in order to enforce or put into effect the provisions of this chapter.

411. Certificates—Notices—Register.) (a) The Commissioner of Buildings shall sign or cause to be signed all certificates and notices required to be issued from the Department of Buildings and shall keep a record of the same, and shall issue or cause to be issued all permits authorized by this chapter.

(b) He shall also keep a proper record of all transactions and operations of the department and such record shall be at all times open to the inspection of the Mayor, Comptroller, Superintendent of Police, Fire Commissioner and members of the City Council.

412. Must Keep Account of Fees Paid—Annual Reports and Estimates.) (a) Said commissioner shall keep in proper books for that purpose an accurate account of all fees charged, giving the name of person to whom same is charged, date on which said charge is made, and the amount of each such fee.

(b) He shall also, annually, on or before the first day of March in each year prepare and present to the City Council a report showing the receipts and expenditures and entire work of the Department of Buildings during the previous fiscal year and he shall on or before November first of each year prepare and submit to the Comptroller an estimate of the whole cost and expense of providing for and maintaining his office during the ensuing fiscal year.

413. Examination and Approval of Plans—Record of Inspections and Complaints.) The Commissioner of Buildings and his assistants shall pass upon all questions relating to the strength and durability of buildings or structures; shall examine and approve all plans before a permit is issued for the construction of any building or structure. The Commissioner of Buildings shall cause to be kept a complete record showing the location and character of every building or other structure for which a permit is issued and shall cause to be filed every report of inspection made on such building, which reports shall bear the signatures of the inspectors making such inspections. He shall cause a record to be kept of all complaints of violations of the building laws and shall cause all such complaints to be investigated.

414. Deputy Commissioner of Buildings—There is hereby created the office of Deputy Commissioner of Buildings. He shall be appointed by the Commissioner of Buildings, according to law. The person certified to fill this office shall be either a civil, structural or architectural engineer or an architect, an experienced building contractor or an efficient building mechanic with at least five years' experience and training.

415. Deputy Commissioner of Buildings—Duties.) (a) The Deputy Commissioner of Buildings shall act as Commissioner of Buildings in the absence of the Commissioner of Buildings from his office and while so acting shall discharge all the duties and possess all the powers imposed upon or vested in the Commissioner of Buildings.

(b) The deputy commissioner of buildings shall, under the direction of the Commissioner of Buildings, have general control of all matters and things pertaining to the work of the Department of Buildings and shall perform such other duties as may be required of him by the Commissioner of Buildings.

416. Engineering Staff.) The Commissioner of Buildings shall appoint according to law at least four Architectural Engineers, and such other engineers and assistants as the City Council may by ordinance provide, for service on the engineering staff of the Department of Buildings. Every person certified to fill the position of Architectural Engineer shall be a civil, structural or architectural engineer of at least five years' training and experience.

417. Architectural Engineers — Duties.) The Architectural Engineers shall, under the direction of the Commissioner of Buildings, examine all plans submitted for the purpose of obtaining a permit. They shall also examine and verify the figures on all floor load placards before such placards are approved for posting. They shall, in addition thereto, perform such other duties as may be required of them by the Commissioner of Buildings.

418. Building Inspector in Charge—Duties.) (a) There is hereby created the office of Building Inspector in charge of the Department of Buildings. He shall be appointed by the Commissioner of Buildings according to law. The person certified to fill this position shall be a civil, structural, architectural or fire protection engineer, or an architect, or building superintendent or a building mechanic, with at least five years' experience in general building construction.

(b) In the absence of the Commissioner of Buildings and the Deputy Commissioner of Buildings from their offices the Building Inspector in Charge shall act as Commissioner of Buildings, and while so acting he shall discharge all of the duties and possess all of the powers imposed upon or vested in the Commissioner of Buildings.

(c) He shall have immediate charge of the periodical inspection of buildings and of the inspection of buildings and structures being erected, enlarged, altered or repaired, excepting only such inspection as is expressly assigned to the elevator or fire-escape inspectors or is by law assigned to some other department of the city government.

419. Assistant Building Inspectors In Charge.) (a) The Commissioner of Buildings shall appoint, according to law, at least four Assistant Building Inspectors in Charge.

(b) Every person certified to fill the position of Assistant Building Inspector in Charge shall be a civil, structural, architectural or fire protection engineer, or an architect, or a building superintendent or a building mechanic with at least five years' experience in general building construction. The Assistant Building Inspectors in Charge shall have immediate charge of the several districts assigned to them by the Commissioner of Buildings and shall perform such other duties as the Commissioner of Buildings shall require them.

420. Building Inspectors.) (a) The Commissioner of Buildings shall appoint according to law such Building Inspectors as may be necessary.

(b) Every person certified to fill the position of Building Inspector shall be a civil, structural, architectural or fire protection engineer, or an architect, or a building superintendent or a building mechanic with at least five years' experience in general building construction. The Building Inspectors shall, under the direction of the Building Inspector in Charge, examine all buildings and structures in the course of erection, enlargement, alteration, repair or removal, as often as is required for efficient supervision, and shall make such periodical examinations of existing structures as shall be assigned to them. They shall examine all buildings, structures and walls reported to be in dangerous condition. They shall examine all buildings and other structures for the enlarging, altering, raising or removing of which, application for permit shall be made.

(c) Every building inspector shall make written reports daily to the Commissioner of Buildings as to the condition in which he found each building examined and as to violations, if any, of the ordinances which the Commissioner of Buildings is required to enforce, together with the street and number of the premises where such violations, if any, were found, the names of the owner, agent, lessee and occupant thereof, and of the architect and the contractor engaged in and about the work in question. The Building Inspectors shall perform such other duties as may be required of them by the Commissioner of Buildings.

421. Elevator Inspector in Charge.) (a) There is hereby created the office of Elevator Inspector in Charge. He shall be appointed by the Commissioner of Buildings according to law.

(b) The person certified to fill the position of Elevator Inspector in Charge, shall be a graduate in engineering from a recognized technical school, shall be versed in the essentials of both mechanical and electrical engineering and shall have had at least five years experience in shop or construction work.

422. Duties of Elevator Inspector in Charge.) The Elevator Inspector in Charge shall examine all plans for the installation of elevators and for the installation of mechanical devices and apparatus in theaters, amusement parks and the like, and, no such elevator, mechanical device or apparatus shall be installed or operated without the approval of the Elevator Inspector in Charge. The Elevator Inspector in Charge shall cause such inspection to be made of all new installations, as may be necessary to insure the carrying out of the approved plans and shall cause such periodic inspection to be made of existing installations of such mechanisms, devices and apparatus, as may be required by the Commissioner of Buildings, and shall perform such other duties as may be required of him by the Commissioner of Buildings.

423. Elevator Inspectors.) (a) The Commissioner of Buildings shall appoint according to law such Elevator Inspectors as may be necessary.

(b) Every person certified to fill the position of Elevator Inspector shall be a mechanical engineer, machinist or elevator builder, and shall be well grounded in the rudiments of mechanical and electrical engineering.

424. Duties of Elevator Inspectors.) The Elevator Inspectors shall inspect all elevators and such other mechanisms, devices and apparatus as shall be assigned to them by the Elevator Inspector in Charge, both existing and in process of being erected or installed, together with all the equipment and enclosures thereof. They shall make written reports daily to the Commissioner of Buildings as to the condition in which

they find the elevators, equipment, enclosures, mechanisms, devices and apparatus, inspected by them, and of any violations of the requirements of this Chapter pertaining to such matters, together with the street and number of the premises where such violations, if any, occur, the names of the owner, agent, lessee and occupant thereof, and of the architect and contractor engaged in or about the construction and installation of such elevators, equipment, enclosures, mechanisms, devices or apparatus. They shall perform such other duties as may be required of them by the Commissioner of Buildings.

425. Secretary—Duties.) (a) There is hereby created the office of Secretary of the Department of Buildings. He shall be appointed by the Commissioner of Buildings according to law.

(b) The Secretary to the Commissioner of Buildings shall, under the supervision and direction of the Commissioner of Buildings, preserve and keep all books, records and papers belonging to the office of the Department of Buildings or which are required by law to be filed therein. He shall perform such other duties as may be required of him by the Commissioner of Buildings.

426. Clerical Assistants.) The Commissioner of Buildings shall appoint according to law, such clerical assistants, stenographers and messengers and other employees as may be provided for by the city council as may be necessary; and they shall perform such duties as may be required of them by the Commissioner of Buildings.

427. Bonds.) The deputy commissioner of buildings, the building inspector in charge, the assistant building inspector in charge, the elevator inspector in charge and the architectural engineers shall, before entering upon the duties of their offices or positions, each execute a bond running to the city of Chicago, conditioned for the faithful performance of their duties, with such sureties as the city council shall approve in the following sums: the deputy commissioner of buildings, ten thousand dollars; the building inspector in charge, the assistant building inspector in charge, the elevator inspector in charge, and the architectural engineers, five thousand dollars each.

428. Employees Not to Engage in Another Business.) Every employee in the Department of Buildings shall devote his entire time to such employment and shall not be engaged in any other business or vocation.

429. Power of Entry.) The Commissioner of Buildings and his Assistants are empowered to enter any building or structure or premises, whether completed or in process of erection, for the purpose of determining whether the same has been or is being constructed and maintained in accordance with the provisions of this chapter and it shall be unlawful to exclude them from any such building, structure or premises.

ARTICLE II.

Permits, Plans and Fees

430. Permits—When Required—Limitations of Time For—Reports of Permits Issued.) Before proceeding with the erection, enlargement, alteration, repair or removal of any building or structure in the city, a permit for such erection, enlargement, alteration, repair or removal shall first be obtained by the owner or his agent from the Commissioner of Buildings, and it shall be unlawful to proceed with the erection, enlargement, alteration, repair or removal of any building or of any structural part thereof within the city unless such permit shall have first been obtained from the Commissioner of Buildings. And if after such permit shall have been granted,

the operations called for by the said permit shall not be begun within six months after the date thereof, or if such operations are not completed within a reasonable time, then such permit shall be void, and no operations thereunder shall be begun or completed until an extended permit shall be taken out by the owner or his agent, and a fee of twenty-five per cent. of the original cost of permit shall be charged for such extended permit, provided, however, that in no case shall a permit be issued or renewed for a less fee than two dollars.

(a) The Commissioner of Buildings shall prepare each day a report of the permits issued on the previous day, giving all the necessary information contained in same, including the legal description when given and the value of building to be constructed or altered, and to file one copy of this report with the Board of Assessors of Cook County, one copy with the Board of Review of Cook County and one copy with the Corporation Counsel of the City of Chicago.

431. Permits—Application For. Application for building permits shall be made by the owner or his agent to the Commissioner of Buildings. When such application is made, plans in conformity with the provisions of this chapter which have been examined and approved by the Commissioner of Buildings and his assistants, as hereinbefore provided for, shall be filed with the Commissioner of Buildings. He shall then issue a permit, and shall file such application, and shall apply to such plans a final official stamp, stating that the drawings to which the same has been applied comply with the terms of this chapter. The plans so stamped shall then be returned to such applicant. True copies of so much of such plans as may be required in the opinion of the Commissioner of Buildings to illustrate the features of construction and equipment of the building, referred to, shall be filed with the Commissioner of Buildings, and shall remain on file in his office for a period of six months after the occupation of such building, after which such drawings shall be returned by the Commissioner of Buildings to the person by whom they have been deposited with him, upon demand. It shall not be obligatory upon the Commissioner of Buildings to retain such drawings in his custody for more than six months after the occupation of the building to which they relate.

432. Approval of Plans by Other Departments.) All plans and drawings for the construction or alteration of any building or other structure for which building permits are required shall, before such permits are issued, be presented to the Commissioner of Health for examination and approval as to the proposed plan for the ventilation of rooms, light and air shafts, windows, the ventilation of water closets, drainage, and plumbing. They shall also be presented to the Chief Fire Prevention Engineer for examination and approval with regard to such ordinances as are within the duty of such office to enforce. They shall also be presented to the Boiler Inspector and the Smoke Inspector in all cases where permits from these departments are required to be procured by the ordinances of the City.

433. Issuance of Permits.) All plans and drawings for the construction or alteration of any building or other structure for which a building permit is required may, at the option of the applicant for a building permit and by payment of a fee of one dollar for each plan, be filed in the office of the Commissioner of Buildings, and a receipt or check will be given for said plans which must be presented for the return of same after they have been examined and passed upon. The Commissioner of Buildings shall appoint a clerk with such necessary assistants whose duty it shall be, under the direction of the Commissioner of Buildings, to receive, take

charge of and return all plans and drawings filed as aforesaid. Every plan or drawing so filed in the office of the Commissioner of Buildings shall be forwarded by him successively to the Department of Smoke Inspection, the Department of Boiler Inspection, the Department of Public Works, the Bureau of Fire Prevention and the Sanitary Bureau, and there submitted to the proper officials of these respective departments and bureaus for examination and approval, and after said plans have been examined and passed upon, the Commissioner of Buildings shall cause said plans or drawings to be returned to his office where they shall be taken up for examination and approval by the Commissioner of Buildings. At the proper time notice shall be given by the Commissioner of Buildings to the applicant that his plans have been examined and are ready to be returned to him, and if such plans have been approved as submitted by the various departments and bureaus as aforesaid, the Commissioner of Buildings then shall, according to ordinance, issue a permit for the construction or erection of such building or structure.

434. Encroachment on Public Highway.) The Commissioner of Buildings shall not issue any permit authorizing the construction, erection repair or alteration of any building or structure unless the plans submitted for his approval clearly show that such building or structure with all its appurtenances, foundations and attachments can be erected entirely within the limits of the lot or tract of land upon which it is proposed to erect such building or structure, except as hereinafter provided, and except as otherwise provided by the ordinances of the City of Chicago, and no permit to erect, repair or alter any building or structure shall authorize the use of any part of any public highway or other public ground for the construction or maintenance of such building or structure except as hereinafter provided, and except as otherwise provided by the ordinances of the City of Chicago, nor shall any permit be issued for the construction or maintenance of any balcony or canopy extending over any public highway or other public ground unless permits therefor have been obtained from the proper department of the City Government, pursuant to an ordinance, specifically authorizing the same. The plans of every building or structure which show that any part of said building or structure or any of its appurtenances, or attachments thereto, extend over any part of any public highway or other public ground than hereinafter provided for shall, previous to being submitted to the Commissioner of Buildings, be submitted to the Commissioner of Public Works and notice thereby given to him of the proposed encroachment upon any public highway or other public ground. Proof of such notice to the Commissioner of Public Works must accompany plans when same are presented to the Commissioner of Buildings.

435. Cornices and Belt Courses.) The Commissioner of Buildings may issue permits for the horizontal cornices and belt courses so called to be constructed on buildings as follows:

Where all parts of a cornice of any building or structure are more than twelve feet above the inside grade of the sidewalk, and in cases where the sidewalk grade varies, are more than twelve feet above the average or mean inside grade of the sidewalk and where such cornice extends in whole or in part along the street frontage, of a building, and where the return of such cornice if any along an alley wall is not longer than a distance equal to the width of the alley, such cornice may project into the street or alley a distance of twenty-four inches. For each additional one foot in height such cornice is placed above the height of twelve feet as

aforsaid up to the limits of height fixed by ordinances for the particular building of which such cornice is a part, such cornice may project into the street or alley an additional one-quarter inch, until the total projection has reached the maximum of four feet six inches where the width of the street is less than sixty-six feet and to a maximum of five feet where the width of the street is sixty-six feet or more.

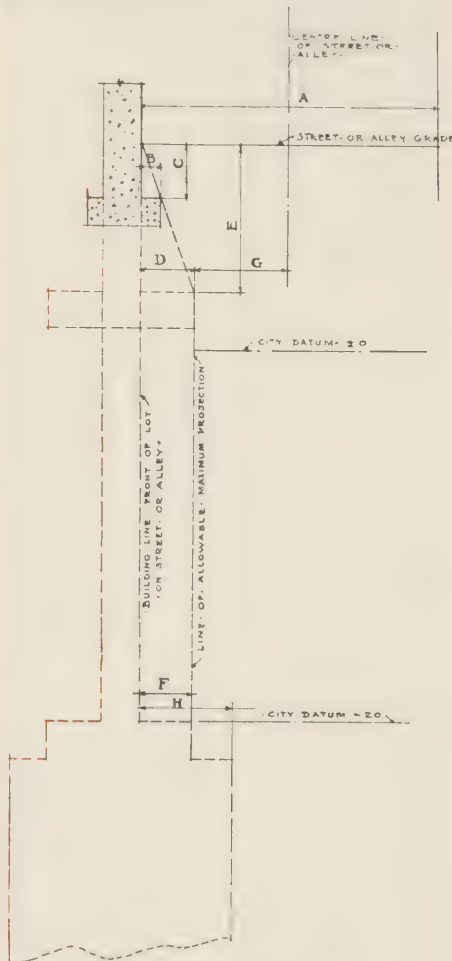


Fig. 1.

FOUNDATIONS.

See Section 436.

- (A) Width of street.
Provision made for 16' 0" or over.
Provision made for less than 16' 0".
- (B) Allowable projection.
A ratio of $4\frac{1}{2}$ " to every foot of (C).
- (C) Depth of foundation below inside sidewalk grade or alley grade—See (B).
- (D) Maximum allowable projection at point (E) 8' 0" below said sidewalk or alley grade = 3' 0".
- (E) Point at depth of formation (8' 0") below sidewalk or alley grade where maximum projection begins. See (D).
- (F) Allowable maximum projection from (E) to 20' 0" below plus or minus 0 city datum = 3' 0".
- (G) For streets, alleys, etc., less than 16' 0" in width. Foundations may not be built nearer than (G) 5' 0" to middle line of streets or alleys, etc.
- (H) Allowable projection below 20' 0" city datum to be determined so far as in the opinion of the Commissioner of Buildings is necessary.

Horizontal belt courses, water tables and other horizontal architectural features, which do not add floor area to a building or structure and which extend in whole or in part along the street frontage of a building with a return if any around an alley wall not longer than a distance equal to the width of the alley, and where all parts of such horizontal belt courses, water tables and other horizontal architectural features are more than twelve feet above the inside grade of the sidewalk, may project into the street or alley a distance not to exceed eighteen inches.

436. Encroaching Foundations.) The Commissioner of Buildings may issue permits for buildings for which it is contemplated that there shall be projections of the foundation, or a part or parts thereof, into a public street, a public alley or a public thoroughfare under the following conditions: Where such street, alley or thoroughfare is sixteen (16) feet or more in width such foundations shall have no projection at the sidewalk or alley grade, but may project at the ratio of four and one-half ($4\frac{1}{2}$) inches to one (1) foot for each one (1) foot of depth such foundation may extend below the sidewalk or alley grade to a maximum projection of thirty-six (36) inches at a depth eight (8) feet below said sidewalk or alley grade, and such foundations, or such part or parts thereof, which are higher than a point twenty (20) feet below city datum and are lower than a point eight (8) feet below the sidewalk or alley grade, may project into such street, alley or thoroughfare for a distance not to exceed thirty-six (36) inches for such part of their extent as is included between a point eight (8) feet below the said sidewalk or alley grade and a point twenty (20) feet below said city datum, and, where said street, alley or thoroughfare is less than sixteen (16) feet in width, foundations, or any part or parts thereof, may project into such street, alley or thoroughfare at a ratio of four and one-half ($4\frac{1}{2}$) inches of projection to one (1) foot of depth, but no foundation, or part or parts thereof, shall be built nearer than five (5) feet to the middle line of such street, alley or thoroughfare. No foundation, or any part or parts thereof, shall project into a public street, a public alley or a public thoroughfare in such manner as to add area to the superstructure of any building or structure.

The construction of caisson and other types of foundations, part or parts of which may extend to a greater depth than twenty (20) feet below city datum, shall conform to the requirements of this section as hereinbefore contained in such part or parts as are higher than twenty (20) feet below city datum and lower than eight (8) feet below the sidewalk or alley grade and in such part or parts as are higher than eight (8) feet below the sidewalk or alley grade, but such part or parts of such last mentioned foundations as are constructed lower than twenty (20) feet below city datum may project into a public street, a public alley or a public thoroughfare so far as, in the opinion of the Commissioner of Buildings, is necessary for the stability of the building or structure of which they are a part.

It is expressly made a condition in the issuance of any permit for the construction of a building or structure whose foundations, or any part or parts thereof, project into a public street, a public alley or a public thoroughfare at any point higher than twenty (20) feet below city datum that if during the construction of or after the completion of such structure or building the said foundation or any part or parts thereof, shall project in such a manner as to interfere with or be an obstruction to the building of, maintaining, conducting or

operating any public utility now or hereafter to be constructed, or any part or parts of any construction in connection therewith, that such projecting foundations, projecting part or projecting parts thereof, shall be subject to removal upon notice from the Commissioner of Public Works so to remove them. Such notice shall be in writing and shall allow such length of time as said Commissioner of Public Works shall deem a reasonable time for the purpose of making the changes required thereunder, but the owner or owners of the said building or structure shall proceed at once upon receipt of said notice to remove all projecting part or parts of such foundations without any expense, loss or damage accruing to the City of Chicago. Upon failure of such owner or owners to comply with said notice by beginning the work required thereunder within thirty (30) days after the receipt of such notice or upon failure to complete same within such reasonable time thereafter as the Commissioner of Public Works shall deem sufficient, the Commissioner of Public Works may proceed at once to remove such projecting part or parts of such foundations and the City of Chicago may recover the cost and expense of such removal, unless otherwise reimbursed, by an action at law against the owner or owners, lessee or lessees of said promises.

437. Additional Plans Showing Projections—Structure with Foundation Below Minus 40 City Datum.) In addition to the general plan of the building or structure as required in other sections of this ordinance, a detailed plan drawn to a large scale of any proposed cornice or any projection contemplated in the two preceding sections shall be submitted to the Commissioner of Buildings for his examination and approval.

Whenever application is made for a permit to erect any building or structure, the foundations of which are designed to extend to an elevation of minus 40 Chicago datum, the plans of said building or structure shall be submitted to the City Engineer and his approval secured before a permit is issued for the erection of such building or structure by the Commissioner of Buildings; provided, however, that this requirement shall only apply within the district bounded as follows: starting at the intersection of the center line of east 12th street produced and the shore of Lake Michigan, thence west along the center line of east and west 12th street to the intersection of the center line of South Halsted street, thence north along the center line of South and North Halsted street to the intersection of the center line of West Chicago avenue, thence east along the center line of West and East Chicago avenue and East Chicago avenue produced to the shore of Lake Michigan, then southeasterly along the shore of Lake Michigan to the place of beginning; and, provided, further, that this restricted provision shall apply to all buildings or structures designed to be erected at any location within the city when the nearest point on any of said proposed buildings or structures is within two hundred feet of the shore line of Lake Michigan, the Chicago River or any of its branches, the Drainage Canal, Lake Calumet or the Calumet River.

438. Plans to be Kept on Work.) In all cases the approved plan, together with building permits, must be kept on the job while the work is in progress.

439. Plans—Essentials of.) All plans and drawings for buildings or for structures other than buildings shall be presented to the Commissioner of Buildings for his approval, and each set of plans presented shall be approved by the Commissioner of Buildings before a permit will be granted. All such plans and drawings shall be drawn to a scale of not less than one-eighth of an

inch to the foot, on paper or cloth, in ink, or by some process that will not fade or obliterate. All distances and dimensions shall be accurately figured, and drawings made explicit and complete, showing the lot lines and the entire sewerage and drain pipes and the location of all plumbing fixtures within such building or structure. No permit shall be granted or plans approved unless such plans are signed and sealed either by an architect licensed to practice architecture under "The Illinois Architectural Act," or by a structural engineer licensed to practice structural engineering under "The Illinois Structural Engineering Act."

440. Plans—Alterations Upon Stamped Plans Not Permitted—Certain Alterations Excepted.) It shall be unlawful to erase, alter or modify any lines, figures, or coloring contained upon such drawings so stamped by the Commissioner of Buildings or filed with him for reference. If, during the progress of the execution of such work it is desired to deviate in any manner affecting the construction or other essentials of the building from the terms of the application, or drawing, notice of such intention to alter or deviate shall be given to the Commissioner of Buildings, and his written assent shall first be obtained before such alteration or deviation may be made; but alterations in buildings which do not involve any change in their structural parts or of their stair ways, elevators, fire-escapes or other means of communication, or ingress or egress, or in lighting or ventilation and that are not in violation of any of the provisions of this chapter, may be made without the permission of the Commissioner of Buildings.

441. Deposit With Water Department—How Made—Indemnity Bonds—Fees for Water Used.) (a) Before the Commissioner of Buildings issues a permit as provided herein, he shall require evidence from the applicant that payment has been made to the Bureau of Water of the city for the water to be used or for a water meter for measuring all the water to be used in the construction of such building in accordance with the regulations of the Bureau of Water. Such applicant shall produce evidence that he has filed with and had approved by the Commissioner of Public Works of the city an indemnifying bond protecting the city against any and all damage that may arise to the streets or alleys upon which such building abuts and to the city and to any person in consequence, or by reason of, the proposed operations to be authorized by such permit, or by reason of any obstruction or occupation of any street or sidewalk in and about such building operations.

(b) The fees to be paid for water used in connection with the erection of buildings shall be as follows, to-wit:

At the rate of five cents for every one thousand bricks, wall measure, used in connection therewith.

At the rate of six cents for every one hundred cubic feet of rubble stone used in connection therewith.

At the rate of eight cents for every one hundred cubic feet of concrete used in connection therewith.

At the rate of fifteen cents for every one hundred yards of plastering used in connection therewith.

At the rate of five cents for every one hundred cubic feet of hollow tile arch, partition or fireproof covering used in connection therewith.

442. Amount of Permit Fees.) (a) The fees to be charged for building permits shall be as follows: For sheds not exceeding three hundred square feet in area, two dollars; for open shelter sheds, at the rate of two dollars for each one thousand cubic feet or fractional part thereof; for all buildings or other

structures, other than sheds and open shelter sheds, as hereinafter described, the fee for the permit shall be at the rate of twenty cents for every one thousand cubic feet or fractional part thereof for buildings containing not to exceed two hundred thousand cubic feet of volume. For buildings exceeding two hundred thousand cubic feet in volume twenty cents per cubic feet for the first two hundred thousand cubic feet and forty cents per one thousand cubic feet for each additional one thousand cubic feet of volume or fractional part, the cubic contents being measured to include every part of the building from the basement floor to the highest point of the roof, and to include all bay windows and other projections; but in no case shall any permit be issued for a less fee than two dollars, except that a fee of two dollars shall be charged for recovering or re-coating the roof of any building.

(b) The fee to be charged for permits issued for alterations and repairs in or to any building or other structure shall be based on the cost of such alterations and repairs and shall be at the rate of two dollars for the first one thousand dollars, or part thereof, and one dollar additional for each one thousand dollars or part thereof to be expended therefor. The fee for permit to raise any building other than a frame building shall be for raising, shoring up, underpinning or moving any building other than a frame building ten cents per one thousand cubic feet of volume or fractional part thereof: Provided, however, that in no case shall a permit be issued for a less fee than five dollars.

(c) In addition to the above permit fees for buildings, permit and inspection fee shall be charged as follows:

For erection of fire-escape, four dollars minimum to include fire-escapes up to four stories in height; and fifty cents additional for each story above four stories in height; For installation or alteration of elevator, five dollars;

For semi-annual inspection of elevator, four dollars;

For erection of billboards or signboards, five dollars; for every twenty-five lineal feet or fractional part thereof;

For erection of illuminated and other roof signs under Section 919 of this chapter, fifty dollars for the first five hundred square feet of superficial area or fractional part thereof and five cents for each additional square foot area;

For annual inspection of billboard or signboard, one dollar for every twenty-five lineal feet of billboard or signboard or fractional part thereof;

For annual inspection of illuminated and other roof signs under Section 919, fifty dollars for the first five hundred square feet or fractional part thereof, five cents additional for each additional square foot area;

For annual inspection of building required by Section 445 of this chapter, three dollars for each twenty-five thousand square feet or fractional part thereof;

For semi-annual inspection of iron or steel curtain, ten dollars;

For semi-annual inspection of asbestos curtain, five dollars;

For permit for tank on roof or tower in excess of four hundred gallon capacity, five dollars;

For permit for isolated chimneys or for chimneys extending over fifty feet above the roof of any building, five dollars;

443. Permit for Wrecking Building—Bond.)

(a) Before proceeding with the wrecking or tearing down of any building or other structure more than one story in height, a permit for such wrecking or tearing down shall first be obtained by the owner or his agent from the Commissioner of Buildings, and it shall be unlawful to proceed with the wrecking or tearing down of any building or structure or any structural part of such

building or structure unless such permit shall first have been obtained. Application for such permit shall be made by such owner or his agent to the Commissioner of Buildings, who shall issue such permit upon such application and the payment of the fee herein provided for. Such application shall state the location and describe the building which it is proposed to wreck or tear down. The fee for such permit shall be five (\$5.00) dollars for every twenty-five feet, or fractional part thereof, of frontage. Upon the issuance of such permit, such building may be wrecked or torn down, provided that all the work done thereunder shall be subject to the supervision of the Commissioner of Buildings and to such reasonable restrictions as he may impose in regard to elements of safety and health, and provided, further, that the work shall be kept sprinkled and sufficient scaffolding be provided to insure safety to human life, and to comply with the Provisions of the Act of the General Assembly, Passed June 3, 1907, in force July 1, 1907, Providing for the safety of workmen in and about the construction and removal of buildings.

(b) Before any permit is issued granting authority to wreck a building or structure for which such permit is required, the person, firm or corporation engaged in the work of wrecking same shall file with the City Clerk a bond with sureties to be approved by the City Comptroller to indemnify, keep and save harmless the City against any loss, cost, damage, expense, judgment or liability of any kind whatsoever which the City may suffer, or which may accrue against, be charged to or be recovered from said City, or any of its officials, from or by reason or on account of accidents to persons or property during any such wrecking operations, and from or by reason or on account of anything done under or by virtue of any permit granted for any such wrecking operations. Such bond in each case shall extend to and cover all such wrecking operations carried on through permits obtained thereunder by such person, firm or corporation during any fiscal year beginning January first and ending December thirty-first, and no permit shall be issued for any wrecking work except as hereinbefore otherwise provided during such fiscal year until such bond is filed. Said bond shall be in the penal sum of twenty thousand dollars for all wrecking operations on such buildings and other structures not more than three stories in height, and there shall be an additional bond filed in the penal sum of twenty thousand dollars or a bond in the penal sum of forty thousand dollars shall be filed in the first instance in case of wrecking operations on buildings and other structures four or more stories in height. Upon the filing of such bond or bonds the person, firm or corporation engaged in the work of wrecking such buildings and other structures may obtain permits for such wrecking operations as are authorized under the said bond or bonds as hereinabove provided for during the fiscal year in which the same is or are filed: Provided, that, in case of accident or casualty in the progress of any wrecking operations carried on under any permit so issued, or the happening of any circumstance which might in the opinion of the Commissioner of Buildings render such bond or bonds inadequate, the said Commissioner may, in his discretion, require such additional bond as he may deem necessary to fully protect the city from loss resulting from the issuance of such permits before he allows the work to proceed or before any additional permits are issued by him.

444. Permit—Revocation of.) If the work in, upon or about any building or structure shall be conducted in violation of any of the provisions of this chapter, it shall be the duty of the Commissioner of Buildings to revoke the permit for the

AN ORDINANCE

The attached amendments were passed by the City Council October 31st, 1929, too late to make the changes in the Ordinance proper. They pertain to permits and inspections on buildings, fire escapes, illuminated signs, elevators, revolving doors, iron and steel curtains and chimneys.

Increases in Permit and Inspection Fees for Buildings.

AN ORDINANCE.

Amending certain sections of The Chicago Municipal Code of 1922 relating to building permit and inspection fees.

Be it ordained by the City Council of the City of Chicago:

Section 1. That Section 442 of The Chicago Municipal Code of 1922 be and the same is hereby amended to read as follows:

"442. **Amount of Permit Fees.**) (a) The fees to be charged for building permits shall be as follows: For sheds not exceeding four hundred square feet in area, three dollars; for open shelter sheds, at the rate of two dollars for each one thousand cubic feet or fractional part thereof; for all buildings or other structures, other than sheds and open shelter sheds, as herein-after described, the fee for the permit shall be at the rate of thirty cents for every one thousand cubic feet or fractional part thereof for buildings containing not to exceed two hundred thousand cubic feet of volume. For buildings exceeding two hundred thousand cubic feet in volume thirty cents per thousand cubic feet for the first two hundred thousand cubic feet and sixty cents per one thousand cubic feet for each additional one thousand cubic feet of volume or fractional part, the cubic contents being measured to include every part of the building from the basement floor to the highest point of the roof, and to include all bay windows and other projections; but in no case shall any permit be issued for a less fee than two dollars.

(b) The fee to be charged for permits issued for alterations and repairs in or to any building or other structure shall be based on the cost of such alterations and repairs and shall be at the rate of two dollars for the first one thousand dollars or part thereof, and one dollar additional for each one thousand dollars or part thereof to be expended therefor. The fee for permit to raise any building other than a frame building shall be for raising, shoring up, underpinning or moving any building other than a frame building twenty cents per one thousand cubic feet of volume or fractional part thereof: Provided, however, that in no case shall a permit be issued for a less fee than five dollars.

(c) In addition to the above permit fees for buildings, permit and inspection fees shall be charged as follows:

For erection of fire-escape, five dollars minimum to include fire-escapes up to four stories in height; and seventy-five cents additional for each story above four stories in height;

For installation or alteration of elevator, five dollars;

For semi-annual inspection of elevator, five dollars;

For erection of billboards or signboards, five dollars for every twenty-five lineal feet or fractional part thereof;

For erection of illuminated and other roof signs under Section 919 of this chapter, seventy-five dollars for the first five hundred square feet of superficial area or fractional part thereof and ten cents for each additional square foot area;

For annual inspection of billboard or signboard, two dollars for every twenty-five lineal feet of billboard or signboard or fractional part thereof;

For annual inspection of illuminated and other roof signs under Section 919 seventy-five dollars for the first five hundred square feet or fractional part thereof, ten cents additional for each additional square foot area;

For semi-annual inspection of iron or steel curtain, fifteen dollars;

For semi-annual inspection of asbestos curtain, five dollars;

For permit for tank on roof or tower in excess of four hundred gallon capacity, ten dollars; for the roof of any building, ten dollars;

For permit for isolated chimneys or for chimneys extending over fifty feet above the roof of any building, ten dollars;

Section 2. That Section 445 of The Chicago Municipal Code of 1922, as amended, be and the same is hereby further amended by striking out paragraphs (h) and (i) thereof, and by inserting in lieu thereof, the following:

(h) Upon making such annual inspection, it shall be the duty of the owner to pay to the city collector an annual inspection fee for same, amounting to five dollars where the said building contains not to exceed 25,000 square feet of floor area. Where the building has a floor area in excess of 25,000 square feet, annual inspection fee of five dollars shall be paid for the first 25,000 square feet of floor area and for each additional 25,000 square feet of floor area thereof, an additional fee of three dollars shall be paid: Provided, however, that no charge for such annual inspection shall be made

(Continued on next page)

against religious, charitable or educational institutions.

(i) Every revolving door now in operation or which may hereafter be installed, together with all the equipment and mechanism thereof shall be inspected semi-annually, under and by authority of the Commissioner of Buildings.

Whenever such inspection shows a revolving door to be in good working order and in compliance with ordinances of the City of Chicago pertaining to revolving doors and their use as exit doors, the Commissioner of Buildings shall issue, or cause to be issued a certificate to that effect; and for each such inspection and certificate a fee of three dollars shall be charged. Provided, however that revolving doors affording exit from ground floor premises used by one person, firm or corporation, shall be exempt from the semi-annual inspection and fee requirements of this paragraph, where such exit door has no connection with or affords no exit facilities to any other floor of the building or to any other premises or space occupied or used by any other person, firm or corporation.

Section 3. That Section 783 of The Chicago Municipal Code of 1922 be and the same is hereby amended by striking out the word "five" as the same appears in the sixteenth line of said section as printed, and by inserting in lieu thereof the word "ten."

Section 4. That Section 882 of The Chicago Municipal Code of 1922 be and the same is hereby amended by striking out paragraph (b) and by inserting in lieu thereof, the following:

"(b) Before the work is commenced a permit shall be obtained from the Commissioner of Buildings in accordance with the provisions in Section 442 of this ordinance."

Section 5. That Section 914 of The Chicago Municipal Code of 1922 be and the same is hereby amended by striking out the words "one dollar" as the same appear in the fifth line of said section as printed, and by inserting in lieu thereof the words "two dollars."

Section 6. That Section 919 of The Chicago Municipal Code of 1922 be and the same is hereby amended by striking out all of paragraph (c) and by inserting in lieu thereof the following:

"(c) Any person, firm or corporation desiring to erect or maintain an illuminated roof sign, as described in this section, shall pay to the City, to cover the cost of inspection and approval by the Commissioner of Buildings of the plans and specifications of such sign, when erected, a fee of seventy-five dollars for the first five hundred square feet of superficial area of such sign or fractional part thereof, and ten cents for each additional square foot. For each annual inspection of any illuminated roof sign by the Commissioner of Buildings, subsequent to the first inspection, there shall be paid a fee of seventy-five dollars for the first five hundred square feet or fractional part, ten cents additional for each additional square foot area over five hundred square feet. In addition to the fees herein required to be paid for inspection, there shall be paid by the owner or person having charge or control of any illuminated roof sign, as herein described, an annual inspection fee to cover the cost of such inspection, which shall be made by the Commissioner of Gas and Electricity, whose duty it shall be to cause such annual inspection to be made, and such fee shall be at the rate provided by the ordinances of the city."

Section 7. This ordinance shall take effect and be in force from and after its passage and due publication.

building or wrecking operations in connection with which such violation shall have taken place. It shall be unlawful, after the revocation of such permit, to proceed with such building or wrecking operations unless such permit shall first have been re-instated or re-issued by the Commissioner of Buildings. Before a permit so revoked may be lawfully re-issued or re-instated, the entire building and building site shall first be put into condition corresponding with the requirements of this chapter, and any work or material applied to the same in violation of any of the provisions of this chapter shall be first removed from such building.

445. Annual Inspection of Buildings—Revolving Doors—Stairways and Means of Egress—Inspection Fee.) (a) The Commissioner of Buildings and his assistants shall make an annual inspection of all theaters and places of amusement, worship, instruction or entertainment, and also of all other buildings over two stories in height, except residences, and except buildings in which automobiles are housed, and except tenements three stories or less in height. It shall be the duty of every owner, agent, lessee or occupant of any such building as is referred to in this section and of the person in charge or control of same to permit the making of such annual inspection by the Commissioner of Buildings, or by a duly authorized Building Inspector, at any time upon demand being duly made.

(b) Whenever any such inspection shows the building to be in compliance with the requirements of this Chapter with respect to stairways, means of egress, and in all other respects, it shall be the duty of the Commissioner of Buildings to issue, or cause to be issued, a certificate setting forth the result of such inspection, containing the date thereof, and a statement to the effect that such building complies in all respects with the provisions of this Chapter, upon the payment of the inspection fee herein required.

(c) It shall be the joint and several duty of the owner, agent, lessee or occupant of the building so inspected and of each and every person in charge and control of the same to frame the said certificate and place it in a conspicuous place near the main entrance of such building.

(d) It shall be the joint and several duty of the owner, agent, lessee or occupant of every building described in this section to provide a typical floor plan of such building reproduced on a sheet eight by ten inches in size. Said plan shall be drawn on as large a scale as will be practicable on such sheet, and said sheet shall also state the street address of such building, and shall give the class of the building, the kind of construction used therein, the height and number of stories contained therein and the nature of the occupancy.

(e) It shall also be the joint and several duty of such owner, agent, lessee or occupant to deliver a copy of said sheet to the Commissioner of Buildings and to frame a copy of said sheet and place the same near the framed certificate hereinabove required.

(f) It shall also be the joint and several duty of the said owner, agent, lessee or occupant to substitute a new sheet for the sheet on file with the Commissioner of Buildings, and also the sheet framed as above required, whenever such changes or alterations are made in such building as will affect the substantial accuracy of the sheet previously furnished such Commissioner and framed as above required.

(g) Where the result of such inspection shall show that such building fails in any respect to comply with the requirements of this Chapter, it shall be the duty of the Commissioner of Buildings to notify the owner, agent, lessee or occupant of such

building to this effect and to specify wherein such building fails to comply with the requirements of this chapter; and it shall thereupon become the joint and several duty of such owner, agent, lessee or occupant to proceed forthwith to make whatever changes or alterations may be necessary to make such building comply in all respects with the requirements of this chapter and to complete such changes and alterations within thirty days after the receipt of such notice.

(h) Upon making such annual inspection, it shall be the duty of the owner to pay to the City Collector an annual inspection fee for the same, amounting to three dollars for each 25,000 square feet of floor area, or fractional part thereof; Provided, however, that no charge for such annual inspection shall be made against religious, charitable or educational institutions.

(i) Every revolving door now in operation or which may hereafter be installed, together with all the equipment and mechanism thereof shall be inspected semi-annually, under and by authority of the Commissioner of Buildings.

Whenever such inspection shows a revolving door to be in good working order and in compliance with the Ordinances of the City of Chicago pertaining to revolving doors and their use as exit doors, the Commissioner of Buildings shall issue, or cause to be issued, a certificate to that effect; and for each such inspection and certificate a fee of two dollars shall be charged. Provided, however, that revolving doors affording exit from ground floor premises used by one person, firm or corporation, shall be exempt from the semi-annual inspection and fee requirements of this paragraph, where such exit door has no connection with or affords no exit facilities to any other floor of the building or to any premises or space occupied or used by any other person, firm or corporation.

446. Architect Must Certify That Plans Comply With the Building Ordinances.) It shall be unlawful for any architect, or other person permitted under the laws of the state to make plans, to prepare or submit to the Commissioner of Buildings for his approval any final plans for any building or structure which do not comply with the structural requirements of this chapter. It shall be the duty of the Commissioner of Buildings to require that all plans submitted to him for approval for any building or structure shall be accompanied by a certificate of such architect or such other person preparing such plans that the plans submitted comply with the structural requirements of this chapter.

447. Constructing Buildings Contrary to Approved Plans—Permit Made Void by Deviation from Plans—Power to Stop Work.)

(a) It shall be unlawful for any owner, agent or architect, or for any contractor or builder engaged in erecting, altering or repairing any building, to make any departure from the plans as approved by the Commissioner of Buildings of such nature that such departure involves any violation of the requirements of this chapter as to buildings of the class in which such building belongs, or to make any changes in plans or construction affecting means of egress, ventilation, natural lighting, or sanitary conditions without first obtaining the written consent of the Commissioner of Buildings and of the Commissioner of Health to such changes. Any such departure from the approved plans involving a violation of the requirements of this chapter or any such change in the plans or construction without the consent of the Commissioner of Buildings and the Commissioner of Health being obtained, as required herein, shall operate to annul the permit which has been issued for such work and shall render the same void.

(b) In case any work is done under a permit authorizing the erection, alteration

or repair of a building or structure, which work is contrary to the approved plans, the Commissioner of Buildings or the Commissioner of Health and their assistants shall have power to at once stop such work and to order all persons engaged therein to stop and desist therefrom. Such work shall not be resumed until satisfactory assurance has been given to the Commissioner of Buildings or the Commissioner of Health, as the case may be, that it will be done according to the approved plan or until said Commissioner of Buildings or Commissioner of Health has consented in writing to the changes made in such approved plans, and if such changes in the approved plan involve additional work a new permit or an extended permit shall be issued for which an additional fee shall be paid by the contractor doing such work.

(c) No contractor or builder shall begin any work on any building or structure for which a permit is required until such permit shall have been secured. In case any work is begun on the erection, alteration, repair or removal of any building or structure without a permit authorizing the same being issued therefor, the Commissioner of Buildings and his assistants shall have power to at once stop such work and to order any and all persons engaged therein to stop and desist therefrom until the proper permit is secured.

ARTICLE III.

Classification of Buildings.

448. **Buildings—Classification of.** (a) All buildings other than sheds and shelter sheds as hereinafter described, now existing or hereafter erected, altered or enlarged, shall be classified as follows:

(b) **Class I.)** In Class I shall be included every building used for the sale, storage or manufacture of merchandise, other than department stores as described in this chapter. Also such buildings, structures or places with a ground area of five hundred square feet or more used as and for the purposes of a barn, stable or a garage or for the housing or keeping of automobiles.

(c) **Class II.)** In Class II shall be included every building referred to in subdivisions Class IIa, Class IIb and Class IIc.

(d) In Class IIa shall be included every building used for office purposes, and also every building used for club house purposes where sleeping accommodations are provided for less than twenty persons.

(e) In Class IIb shall be included every building used for hotel, club, lodging or rooming house purposes where such building has sleeping accommodations for twenty or more persons.

(f) In Class IIc shall be included every building used for a hospital where sleeping accommodations for more than ten persons are provided in such building, and every building used for a home, day nursery or asylum where any such building shall have accommodations for more than twenty persons or where more than ten bedridden or decrepit persons are housed, and every building used for a jail, house of correction or detention.

(g) **Class III.)** In Class III shall be included every building used as a private residence, also every building used for a hospital where sleeping accommodations for ten or less persons are provided in such building, and every building used for a home, day nursery or asylum where any such building shall have accommodations for not to exceed twenty persons or where not to exceed ten bedridden or decrepit persons are housed, and also every building, structure or place with a ground area of less than five hundred square feet used as and for the purposes of a barn, stable or garage or for the housing or keeping of automobiles.

(h) **Class IV.)** In Class IV shall be included every building referred to in subdivisions Class IVa, Class IVb, Class IVc, and Class IVd, as follows:

(i) In Class IVa shall be included every building used as a church or place of worship.

(j) In Class IVb shall be included every building having a parish hall, Lodge hall, dance hall, banquet hall, skating rink, assembly hall, halls used for the purpose of exposition and exhibition, and buildings having a hall for the purpose of instruction other than schools, included in Class VIII, and also every existing building having a hall used for theatrical purposes at the time of the passage of this ordinance, except such buildings as are included in Classes IVa, IVc, IVd, and V.

(k) In Class IVc shall be included every building hereafter erected used for moving picture and vaudeville shows and similar entertainments, where an admission fee is charged and regular performances are given, and where the seating capacity does not exceed three hundred persons, provided, that every building of Class IVc existing at the time of the passage of this ordinance shall comply with the provisions of Class IVb.

(l) In Class IVd shall be included every grand stand and every baseball athletic and amusement park.

(m) **Class V.)** In Class V shall be included every building which is used as a public theatre where an admission fee is charged and in which movable scenery is used, and every assembly hall hereafter erected having a seating capacity of over 300 persons and containing a permanent stage or which scenery and theatrical apparatus are used and regular theatrical vaudeville performances are given; provided, however, that public halls and club halls with a seating capacity of less than 600 persons although occasionally used for theatrical presentations, shall not be construed to be public theatres within the meaning of the term as used in this section, notwithstanding the fact that movable scenery is used upon the stages thereof on such occasions, and such public halls and club halls shall not be considered as buildings of Class V as herein defined. Such public halls and club halls shall be included in Class IVb, as defined in this section.

(n) **Class VI.)** In Class VI shall be included every tenement and apartment house or building or portion thereof which is used or intended to be used as a home or residence for two or more families living in separate apartments.

(o) **Class VII.)** In Class VII shall be included every building used for the sale at retail of dry goods and other articles of general merchandise and commonly known and described as a department store.

(p) **Class VIII.)** In Class VIII shall be included every building used for school purposes and every building containing class rooms for special or general instruction, other than halls for the purpose of instruction as included in Class IV, where such building so used shall have a seating capacity of more than fifty students.

(q) **Class IX.)** In Class IX shall be included every building maintained by the City of Chicago for police station purposes.

(r) Requirements with regard to buildings not within any of the above classes shall be determined by the Commissioner of Buildings subject to arbitration in the same manner as provided in Sections 407 and 408 of this chapter.

449. **Buildings Used for the Purposes of More Than One Class.)** Where any building is used for the purposes of two or more classes, as herein specified, and defined, such portion of any such building as is devoted

to the uses and purposes of any particular class shall be constructed, operated and maintained in accordance with the requirements of this chapter relating to such class, unless such construction shall, in the opinion of the Commissioner of Buildings, prove impracticable, or unless there would be a conflict between the provisions of this chapter relating to the construction of buildings, in either of which cases the construction requirements which relate to and govern the construction of buildings of the class requiring the best and safest form of construction shall govern the entire building; provided, however, that in any building exceeding twenty stories in height, where such building is used to house five or more self-propelled vehicles in addition to other uses, and not more than one-third of such building is so used for the housing of five or more self-propelled vehicles; and such building is throughout of fireproof construction and the portion of such building so used for the housing of five or more self-propelled vehicles is completely separated by fireproof walls and fireproof roof from the remainder of the building such portion of said building so used for the housing of five or more self-propelled vehicles shall comply with the requirements for class I buildings as set forth in this chapter, and the remainder of such building shall comply with the requirements of the class of buildings applicable to the purposes for which such portion of said building is to be used.

Passed, July 22, 1925.

450. Conflict Between Special and General Provisions.) Whenever any provision or requirement of this chapter relating specifically to the construction, equipment, maintenance, or operation of any building or part of a building used for the purpose of any specified class, shall conflict with the general provisions of this chapter relating to the construction, equipment, maintenance and operation of buildings generally, the special provisions shall govern in each case, except in the case of Section 705, which shall govern in all cases coming within its provisions.

ARTICLE IV.

Buildings of Class I.

451. Class I Defined.) In Class I shall be included every building used for the sale, storage or manufacture of merchandise, other than department stores as described in this chapter. Also such buildings, structures or places with a ground area of five hundred square feet or more used as and for the purpose of a barn, stable or a garage or for the housing or keeping of automobiles.

452. Must Comply With General and Special Provisions.) Every building of Class I shall comply with the general provisions applicable to the kind of building it is as set forth in this chapter and shall, in addition, comply with the following special provisions.

453. Buildings—Construction of—in Relation to Height.) (a) The construction of buildings of Class I shall be as follows: Buildings of Class I which are 100 feet in height or higher shall be built of fireproof construction.

(b) Buildings of Class I which are less than 100 feet in height and more than 50 feet in height shall be built of slow-burning, mill or fireproof construction. Buildings of Class I of slow-burning or mill construction shall not be built more than seven stories in height.

(c) Buildings of Class I of ordinary construction shall not be built more than four stories in height.

454. Skeleton Steel Walls—Metal Lath and Solid Cement Plaster Covers.) (a) A one or two story building used for the purposes of Class I, no part of which is within twenty feet of any lot line, alley line or street line, having a complete self-supporting

steel frame consisting of wall columns, supporting steel trusses, with steel trusses and steel diagonals, designed to resist safely, within the safe limits of stress provided by this chapter, a wind pressure of twenty pounds per square foot, for each and every exterior surface exposed to the wind, in addition to the dead weight of the completed structure, and in addition to the live load of 100 pounds per square foot provided for by this chapter, and any other live loads which may be imposed on such structure, may have exterior walls measuring not less than one and one-third inches thick of metal lath or metal fabric plastered on both sides with a mortar consisting only of Portland cement and torpedo sand. Complete reinforced concrete framework, built in every manner equally as strong and as safe as provided for a steel frame, in this section, may have exterior walls built in the same manner of the same materials and of the same thickness.

(b) The enclosing walls of buildings which are built not less than fifty feet from any lot, alley or street line may be constructed of corrugated iron, supported on a steel frame built as specified in this section.

455. Buildings for Explosives.) (a) Buildings for the storage of fireworks and of similar substances or articles of an explosive nature shall have walls of masonry construction, shall not exceed one story in height, shall not exceed sixteen hundred (1,600) square feet in area unless such building is divided into areas of sixteen hundred (1,600) square feet or less by dividing walls the construction of which and the equipment of openings in same being in compliance with the requirements of Section 463 of this chapter. The roof of such building may be constructed of wood joists and roof boards covered with incombustible material or of wood joists covered with sheet metal or of common glass set in metal frames, but in every case at least thirty (30%) per cent of the area of such roof shall be constructed of common glass and metal frames. Such buildings shall be situated not less than one hundred feet from any other building or structure and shall be situated not less than one hundred feet from any lot line, or where such lot line abuts a street, alley or public thoroughfare said building shall be situated not less than one hundred feet away from the opposite side of such street, alley or public thoroughfare.

(b) Buildings erected for the collection or compression of acetylene gas at a pressure of exceeding fifteen (15) pounds to the square inch shall be of fireproof construction throughout and shall be located at least two hundred and fifty feet away from any other building or structure and at least two hundred and fifty feet from any lot line and any street, alley or public thoroughfare.

456. Buildings for Housing Motor Driven Vehicles.) (a) Every building or structure hereafter erected and every existing building or structure hereafter increased in size or otherwise altered or hereafter converted or used for the purpose of housing five or more self-propelled vehicles or other wheeled machines, containing in the tanks thereof volatile inflammable liquid for fuel or power, and all adjoining buildings and structures not separated therefrom by dividing walls of brick or concrete extending at least three feet above the roof and having openings, if any, protected on both sides by approved automatic fire doors, where such building or structure is more than one story and less than four stories in height shall be of fireproof construction throughout, or shall be equipped throughout with an automatic sprinkler system. Where any such building is two stories or less in height and complies in all other respects with the requirements for fireproof construction and the second floor area is co-extensive with the area of the building and without openings

other than for stairs and elevators, such one or two-story building as aforesaid may have a roof of ordinary, slow-burning or mill construction. Where any such building two stories or less in height has a mezzanine floor or floors with a total area larger than twenty per cent of the area of the building it shall be considered an additional floor and that part or those parts of building containing such additional floor or floors shall be separated from every other part of said building by a wall of brick or concrete built of thickness as required for enclosing walls by the provisions of this chapter, and such parts of building so separated by such dividing wall shall have no openings in their floors from story to story other than is required for stairs and elevators. The openings connecting the different areas of such buildings shall be protected by double automatic fire door equipment. Every such building or structure more than three stories in height shall be of fireproof construction throughout and shall be equipped throughout with an automatic sprinkler system. In all such buildings more than two stories in height all window openings, except in walls that adjoin a public street fifty feet or more in width, shall be equipped with approved metal frames and sash glazed with wired glass. Buildings less than three stories high shall comply with the requirements of Section 784 of this chapter. All floor openings in non-fireproof buildings shall be enclosed in walls of masonry of such thickness as required by the provisions of this chapter and shall extend from the ground through the roof of the building; in fireproof buildings, all elevator shafts and other vertical shafts except stairways shall be enclosed in every story with walls of brick, tile, plain or reinforced concrete at least eight inches thick, all stairways shall be enclosed in every story with walls of brick, tile or reinforced concrete at least four inches thick and all openings in such enclosing walls shall be equipped with approved automatic or self-closing fire doors. There shall be no basement in any such building, except for boiler room purposes, unless such building, including the roof and the protection of the roof beams and roof girders, is of fireproof construction throughout and is equipped throughout with an automatic sprinkler system, and with no floor openings between the basement and other floors, except for stairs and elevators, and such openings shall be enclosed in both the basement and first floor by walls of brick or concrete at least eight inches thick or of fireproof tile at least twelve inches thick and equipped with doors as hereinbefore specified. There shall be no openings from the boiler room except to the outside of the building. Where such building is on a lot that adjoins two streets or a street and an alley whose established grades are not at the same elevation the story whose floor is higher than two feet below the lower of these grades shall, for the purpose of this section, be deemed the first story of said building.

Buildings of fireproof construction, except buildings used as hospitals, theaters, churches, schools and public halls, may be used to house self-propelled vehicles, provided, however, that the portion of the building used for such housing is separated from all the other portions of the building; which separation shall be by walls or floors of solid brick or concrete, not less than twelve inches thick, having no openings into the other portions of the building. The floors of said portion of such buildings used for such housing shall be of solid concrete construction. All openings from floor to floor shall be enclosed with twelve-inch brick or concrete walls; all doors on these walls around floor openings to be standard metal fire doors, and shall be of a self-closing or automatic type. The portion of such buildings housing self-propelled vehicles shall be equipped

with an approved automatic sprinkler equipment. All such buildings of eighty feet or more in height shall be equipped with inside standpipe fire lines subject to the approval of the Fire Commissioner. Where the floor area on one floor used for the purpose of housing self-propelled vehicles is in excess of 5,000 square feet, three sides of such portion of such buildings shall be at least fifteen feet removed from any other structure or building. Floor areas on one floor shall not exceed 12,000 square feet. Floor areas in excess of 12,000 square feet shall be divided into areas of 12,000 square feet, or less, by standard fire walls of twelve-inch brick or concrete, all openings in same to be protected by standard double automatic fire doors. The entrance to and exit from each floor containing self-propelled vehicles shall be by means of a fire shield stairway tower. All openings from said stairway tower shall lead to a platform open on one side to the open air, the open side to be protected by an approved railing or grating, and the opening to approximate 80 per cent of the wall area. All doors leading to this open platform to be standard metal self-closing fire doors. There shall be installed a vent shaft in that portion of the building housing self-propelled vehicles, equal to four square feet in cross-section area for each five cars capacity. Such vent shaft shall not be required where three sides of the compartment housing self-propelled vehicles open to a space of fifteen feet or more. This vent shaft shall be in addition to the normal ventilating requirements, and together with its appurtenances shall be installed in such manner as will meet with the approval of the Fire Commissioner.

Passed, July 22, 1925.

(b) Every building, structure or place not now used for the housing of four or less vehicles containing volatile inflammable liquid in the tanks thereof but hereafter converted to such use, and every building or structure hereafter erected for the housing of four or less such vehicles, where so used, must be occupied and used exclusively for such purposes under the following conditions and with the exceptions hereinafter noted:

Frame sheds or buildings may be so used if such shed stands at least five feet from every other building or structure on the same lot or plot of ground; provided, however, that in frame buildings used exclusively for Class I purposes a portion of such building may be so used if the part so occupied is separated from all other parts of the building by a brick dividing wall extending three feet above the highest point of the roof, and in such dividing wall all openings, if there are any, shall be equipped with standard automatic or self-closing fire doors on each side of the wall.

Brick buildings with roof of ordinary construction may be so used if they are located three feet or more from every other building or structure upon the same lot or plot of ground. In buildings of ordinary, slow-burning or mill construction used exclusively for Class I purposes, four or less such vehicles may be housed provided that part of the building so occupied is separated from all other parts of such building by a brick wall extending three feet above the highest point of the roof and in which the openings, if any, are equipped with approved automatic or self-closing fire doors on each side thereof. If such building is more than one story high in lieu of extending hereinbefore required wall through the upper stories and through the roof as described, the floor system immediately above space in which such vehicles are kept may be built of fireproof construction connecting with wall separating such space from other parts of the building and which is carried through the story so occupied by such vehicles.

Brick buildings with a roof of fireproof construction may be so used and may ad-

join any other building or structure, but no openings shall connect the same with any building other than a building of Class I.

Buildings containing not to exceed one living apartment and in which four or less vehicles containing volatile inflammable liquid are housed, must have brick or masonry walls and not exceed two stories in height. The floor of the second story shall be of fireproof construction throughout or if of combustible material shall be protected on the underside for the entire area of such floor by two complete coverings of metal lath and fire-resisting plaster applied separately. There shall be two stairways from said apartment to the ground placed as far apart as practicable, one of such stairways may be an outside stairway. The interior stairway or stairways shall be enclosed on the first floor by partitions of four-inch tile or partitions of metal lath and plaster on metal studding in such a manner that exit by means of the stairway shall be direct to the outside of building, and there shall be no doorways or other openings from enclosure containing such stairway into the first story.

457. Buildings for Smoking Meats.) Buildings or structures for the purpose of smoking meats or fish shall have brick walls and shall have a roof of fireproof construction. No combustible material shall be used in the erection of such building. Where smoke houses are built inside of another building, they shall be constructed entirely of metal or have brick walls with a fireproof roof or ceiling and no combustible material shall be used in their construction.

458. Buildings for Dry Cleaning.) Buildings in which machinery and equipment is installed for the purpose of dry cleaning shall stand at least fifty feet from any lot line and not nearer than fifty feet to the nearest point of approach of any other buildings or structure upon the same lot. Such buildings shall be of fireproof construction, shall not be over two stories in height and shall have no basement or attic. Walls shall be at least twelve inches thick. All window openings in outside walls shall be equipped with approved metal frames, metal sash and wired glass. All exterior and interior door openings shall be equipped with an approved three-ply laminated door covered with sheet metal or its equivalent in fire-resisting quality. There shall be no floor openings except for one interior stairway and said stairway shall be enclosed upon the first floor in such a manner as to give direct exit from stair and stair hall to the outside without any doorway or other opening from stair or stair hall to first story of building. An additional outside metallic stairway or additional stairways at least three feet wide shall also be provided. The boiler shall be located in a separate building and so situated that the line of travel for gases between any opening in boiler room and the opening in the dry cleaning or dry room shall be not less than twenty feet. Such dry cleaning and dry room shall be provided with vent holes at the floor line not less than sixteen square inches in area, at least six feet apart.

459. Buildings for Motion Picture Films.) Buildings for the storage of more than two thousand (2000) feet of motion picture films, or buildings in which more than two thousand (2000) feet of motion picture films are stored shall be of ordinary, slow-burning, mill or fireproof construction and not more than two stories high, unless of fireproof construction. In all buildings in which motion picture films are stored all elevators and stairs shall be enclosed in all stories where such film storage occurs, and in all stories above such stories where motion picture films are stored. In buildings of ordinary construction such stair and elevator enclosure shall be of brick walls at least

twelve (12) inches thick supported on the ground or upon fire-proofed structural steel. In fireproof buildings all elevators and stairs shall be enclosed with brick walls at least eight (8) inches thick, or with reinforced concrete or with fireproof tile at least four (4) inches thick.

Vaults for the storage of motion picture films in non-fireproof buildings shall be of brick or of reinforced concrete at least twelve (12) inches thick. The floors and tops of such vaults shall be of brick or of concrete or of reinforced hollow tile at least twelve (12) inches thick, or of reinforced concrete at least eight (8) inches thick. In fireproof buildings vault walls shall be of either fireproof tile, brick, concrete or reinforced concrete. The floors and tops shall be of brick or of concrete at least twelve (12) inches thick, or of reinforced concrete at least eight (8) inches thick, or of fireproof tile or of reinforced hollow tile at least ten (10) inches thick. The thickness of vault walls shall be the same as herein specified for floors and tops where the same material is used for their construction, except that walls of fireproof tile shall be at least twelve (12) inches thick.

The vent flues for vaults shall be of the same construction as is required for smoke flues of the same area for such buildings. In fireproof buildings such vent flues may have walls at least four (4) inches thick of stone or gravel concrete reinforced with three-eighths ($\frac{3}{8}$) inch diameter round steel rods. Rods shall be set both vertically and horizontally, shall be spaced twelve (12) inches on centers where set horizontally and shall be spaced eighteen (18) inches on centers where set vertically. Or the walls may be four (4) inches thick of hollow clay tile set with the voids vertical and having all voids filled with stone or gravel concrete and with all joints filled with cement mortar and have metal bands at least one-fourth ($\frac{1}{4}$) inch thick by one (1) inch wide embedded within the horizontal joints on all sides of the flue at intervals of not less than four (4) feet in height such bands being secured to metal plates four (4) inches square and one-fourth ($\frac{1}{4}$) inch thick placed flat against the outside face of the tile, or bands shall be secured to each other in a manner to effectually prevent walls of the flue from spreading when subjected to heat. Where two or more flues are built together the bands may extend from outside to outside of the group or be arranged in such a manner as to effectually prevent the spreading of the walls of any flue within the group. Where tile is used for flues the exterior walls of detached flues or the outside walls of a group of flues shall be covered with two coats of cement plaster on wire lath brought close to the intersecting walls, floors and ceiling. Above the roof level tile walls shall be encased with four (4) inches of brick laid in cement mortar. Vent flues for vaults which are located in the top story of a fireproof building may be constructed of No. 14 U. S. gauge metal from the vault connection to the termination of the flue, and all that portion of the flue which is within the building and all that is not more than eighteen (18) inches above the roof shall have a coating of asbestos plaster at least two (2) inches thick covered with two coats of cement plaster on metal lath. Such other construction of vent flues will be permitted as will meet with the approval of a Board consisting of the Commissioner of Buildings and the Chief Fire Prevention Engineer and shall be regarded by such board as being equal in character and fire-resisting qualities to the foregoing.

In buildings of fireproof construction rooms for examining and for repairing motion picture films shall be enclosed in partitions of fireproof or incombustible material at least four (4) inches thick.

In buildings of fireproof construction rooms used for receiving, distributing or the shipping of motion picture films shall be enclosed in partitions or walls of brick or concrete or fireproof tile at least eight (8) inches thick, or of reinforced concrete at least six (6) inches thick.

Such partitions and the enclosing walls of such rooms, except where they face upon a public street at least fifty (50) feet wide, shall have window openings in same equipped with approved metal frames and sash and glazed with wired glass, and all door openings shall be equipped with approved single automatic-closing fire doors.

In non-fireproof buildings in addition to all of the above requirements, the floors and ceilings of such rooms or compartments must be of fireproof construction as defined in this chapter.

460. Door Openings—Revolving Doors.)

(a) The aggregate width of door openings at or approximately at the street level in buildings of Class I shall be equal to the aggregate width of stairways, as specified in Section 878 of this chapter for buildings of Class I. Where locks are used on exit doors or on doors or gates leading to hallways or stairways which lead to exit doors they shall be so arranged that the door or gate may be opened from the inside without the use of a key. Where locks are used on automatic fire doors in stair shafts of buildings in which approved sprinkler systems are installed, said doors may contain just above the locking device a fire-resisting glass panel containing not less than 81 square inches nor more than 450 square inches of exposed fire-resisting glass. In every building of this class every door to an exit which is a means of egress for twenty or more persons shall open outward, and every door which is a means of exit from any floor above the first, shall open outwardly from the space or hallway in which the stairway from such upper floor is located. A door or doors when open shall not project over a public sidewalk or public space.

(b) Revolving doors shall not be installed in any door opening of any building unless the revolving wings of such revolving doors are so arranged that, by the application of a force slightly more than is necessary to revolve said doors and which one person of ordinary strength is capable of exerting, all the wings of said door fold flat on each other and in an outward direction, or unless the revolving wings of said revolving doors are so arranged that they may be readily collapsed or removed by pressure or simple mechanical means, to be approved by the Commissioner of Buildings, and leave sufficient opening for two or more persons to pass through with a minimum width of not less than twenty-two inches on each side of said collapsed doors.

Where revolving doors are used as exits they shall be credited as exits only to the extent of the clear space remaining when the doors are collapsed and all deficiency of required exits must be made up by additional doors.

461. Existing Buildings of Class I—Increasing Height of.) In all cases where buildings of Class I of ordinary construction built prior to March 13, 1911, are to be increased in height above the height of fifty feet, or of mill or slow-burning construction above the height of ninety feet, the additional parts of such buildings shall be constructed as herein provided for buildings over fifty feet in height or over ninety feet in height, respectively, and said additional parts shall be made to conform in all respects to the requirements for buildings of this class more than fifty feet in height or more than ninety feet in height, respectively, before it shall be lawful to occupy them.

462. Fire Walls.) (a) Buildings occupied by more than one person, firm or cor-

poration, or for more than one business enterprise conducted by the same person, firm or corporation, in separate enclosures on any one floor, shall have a brick dividing wall for every fifty feet of street frontage, if of ordinary construction, or for every eighty feet of street frontage, if of slow-burning or mill construction, and such dividing walls shall extend from the front to the rear wall and such dividing walls and the doors therein shall be built in accordance with the provisions of Section 789 of this chapter.

(b) All of the partitions between the parts of such buildings occupied by different persons, firms or corporations, shall be built of incombustible material from the floor to the floor boards or roof boards next above such story or stories so occupied.

(c) Only metal framed windows glazed with one-quarter inch thick wire glass may be used in such partitions.

463. Dividing Walls—When Required.)

(a) Dividing walls will be required in buildings of Class I as follows:

(b) Every building of ordinary construction having a greater area than 9,000 square feet shall be divided into areas of 9,000 square feet or less by dividing walls; provided, however, that buildings of ordinary construction more than one story in height and having in addition to the requirements of this ordinance relating to buildings of ordinary construction with areas not greater than 9,000 square feet, a frontage on at least two public thoroughfares, and having all stairways and elevator shafts and other floor openings enclosed with brick masonry walls with all openings in same protected with approved automatic fire doors and all stair halls at street or ground level so constructed as to open directly or through a fireproof tunnel to a street or public alley and equipped throughout on all floors and basement with an automatic sprinkler system meeting with the approval of the Chief Fire Prevention Engineer may be built with an area of 12,000 square feet but if of greater area shall be divided into areas of 12,000 square feet or less by dividing walls.

(c) Every building of slow-burning or mill construction more than one story in height having greater area than 12,000 square feet, shall be divided into areas of 12,000 square feet or less by dividing walls; provided, however, that buildings of slow-burning or mill construction more than one story in height and having in addition to the requirements of this ordinance relating to buildings of slow-burning and mill construction having areas not greater than 12,000 square feet, a frontage on at least two public thoroughfares, and having all stairways and elevator shafts and other floor openings enclosed with brick masonry walls with all openings in same protected with approved automatic fire doors and all stairhalls at street or ground level so constructed as to open directly or through a fireproof tunnel to a street or public alley and equipped throughout on all floors and basement with an automatic sprinkler system meeting with the approval of the Chief of Fire Prevention and Public Safety, may be built of an area of 16,000 square feet, if of greater area shall be divided into areas of 16,000 square feet or less by dividing walls.

(d) Every fireproof building more than two stories in height and having greater area than 30,000 square feet, shall be divided into areas of 30,000 square feet or less by dividing walls.

(e) Where dividing walls are required in any of the above mentioned buildings, such building shall be subdivided by brick walls, built of the thickness given in the table for the thickness of enclosing walls and all doors or other openings in such walls shall have at each side of the same, iron

doors, tin clad doors or shutters, as described in Section 789 of this chapter, and said buildings as subdivided shall be provided with stairs and fire escapes the same as hereinafter required; provided, however, that one-story buildings of ordinary mill or slow-burning construction and two-story buildings of fireproof construction of any size when used as one store, room or workshop and occupied by only one person, firm or corporation, may be erected without any dividing walls.

464. Display of Placard—Indicating Floor Strength—Fee.) (a) It shall be the duty of the owner of every building of Class I now in existence or hereafter erected, or of his agent, or of the occupant, or person in possession, charge or control of same, to affix and display conspicuously on each floor of such building, a placard, stating the uniformly distributed load per square foot of floor surface, which may with safety be applied to that particular floor, as provided by this chapter, or if the strength of different parts of any floor varies, then there shall be such placards for each varying part of such floor. It shall be unlawful to load any such floors or any part thereof to a greater extent than the loads indicated upon such placards.

(b) It shall be the duty of the occupants of such buildings to maintain such placards during their occupation of the premises and it shall be the duty of the owners of buildings, or their agents, to cause the same to be properly affixed with each change of occupation. It shall be the duty of the owner, agent or lessee of each such building, now in existence, or hereafter erected, to procure and submit evidence of the correctness of the figures on such placards to the Commissioner of Buildings. Whenever such evidence as to the correctness of the figures shall be satisfactory to the Commissioner of Buildings, he shall approve such placards. Such placards so approved by the Commissioner of Buildings shall then be affixed upon the respective floors of the different buildings. The calculations and loads shall be in accordance with the provisions of this chapter.

(c) It shall be the duty of the owner, agent or lessee to pay to the City Collector a fee amounting to five dollars for each ten thousand square feet of floor area or less, for more than ten thousand square feet of floor area and not to exceed fifty thousand square feet of floor area ten dollars, for each additional fifty thousand square feet of floor area in excess of the first fifty thousand square feet of floor area ten dollars additional, and for issuing new placards in place of lost placards, the fee shall be for ten thousand square feet or less two dollars; for more than ten thousand square feet, five dollars. For the purpose of determining the amount of the fee herein required to be paid, every part of a structure separated by dividing walls as required by Section 463 of this chapter shall be considered as a separate building.

465. Live Loads for Floors.) The floors of all buildings of Class I hereafter erected shall be designed and constructed in such a manner as to be capable of bearing, in addition to the weight of floor construction, partitions, permanent fixtures and mechanisms that may be set upon the same, a live load of one hundred pounds for every square foot of surface, and the strength of such building shall be increased above the capacity to carry such a live load of one hundred pounds per square foot of floor surface, when the uses to which such building, or part thereof, is to be applied, involve greater stress. The calculations and loads shall be in accordance with the provisions of this chapter. In every building of Class I now constructed and in use, whenever it shall be found by the Commissioner of Buildings that the floors of same, or any part or parts thereof, are not capable of bearing, in addition to the weight of the floor construction,

partitions, permanent fixtures and mechanisms that may be upon the same, a live load of forty pounds for every square foot of surface, he shall condemn the same and order such floor or floors to be repaired or reconstructed within a reasonable time by the owner or occupant thereof, and shall proceed in the manner prescribed in sections 402 and 403 of this chapter, and in such case it shall be unlawful for the owner or occupant to continue to use such building until the said floors shall be repaired or reconstructed in accordance herewith.

466. Elevator Buildings.) Elevator buildings intended solely for the receipt, storage and delivery of grain in bulk, shall be of fireproof construction as described in this chapter.

ARTICLE V.

Class II.

467. Class II Defined.) (a) In Class II shall be included every building referred to in subdivisions herein designated as Class IIa, Class IIb and Class IIc.

(b) In Class IIa shall be included every building used for office purposes, and also every building used for clubhouse purposes where sleeping accommodations are provided for less than twenty persons.

(c) In Class IIb shall be included every building used for hotel, club, lodging or rooming house purposes where such building has sleeping accommodations for twenty or more persons.

(d) In Class IIc shall be included every building used for a hospital where sleeping accommodations for more than ten persons are provided in such building, and every building used for a home, day nursery or asylum where any such building shall have accommodations for more than twenty persons or where more than ten bedridden or decrepit persons are housed, and every building used for a jail, house of correction or detention.

468. Must Comply with General and Special Provisions.) Every building of Class II shall comply with the general provisions of this chapter, and in addition to the general provisions shall comply with the following special provisions:

469. Load Bearing Capacity of Floors in Buildings of Class II—Doors and Door Openings, Requirements for.) (a) For all buildings of Class II the floors shall be designed and constructed in such a manner as to be capable of bearing in all their parts, in addition to the weight of floor construction, partitions, permanent fixtures and mechanisms that may be set upon the same, a live load of fifty pounds per square foot of surface, and such floor bearing capacity shall be computed in accordance with the provisions of this chapter.

(b) The aggregate width of door openings at, or approximately at the street level in buildings of Class II shall be equal to the aggregate width of stairways as specified in Sections 878, 879 and 880 of this chapter for buildings of Class II. Revolving doors may be installed in door openings of any building of Class IIa and Class IIb where the revolving wings of such revolving doors are so arranged that, by the application of a force more than is necessary to revolve said doors and which one person of ordinary strength is capable of exerting, all the wings of said door fold flat on each other and in an outward direction, or unless the revolving wings of said revolving doors are so arranged that they may be readily collapsed or removed by pressure or simple mechanical means, to be approved by the Commissioner of Buildings, and leave sufficient opening for two or more persons to pass through with a minimum width of not less than twenty-two inches on each side of said collapsed doors.

Where revolving doors are used as exits they shall be credited as exits only to the extent of the clear space remaining when the

doors are collapsed, and all deficiency of required exits must be made up by additional doors.

470. **Windows and Mechanical Ventilation.**) (a) In every building hereafter erected for or converted to the purposes of this class, courts shall be of the minimum widths and areas prescribed in Section 644 of this chapter, and vent shafts as defined in Section 634 of this chapter, shall be of the following minimum width and areas:

Height of Shaft.	Least Width in Feet.	Square Feet.
1 story	3	21
2 stories	3	22½
3 stories	3	27
4 stories	3	36
5 stories	5	48
6 stories	6	72
7 stories	8	96
8 or more stories.....	8	120

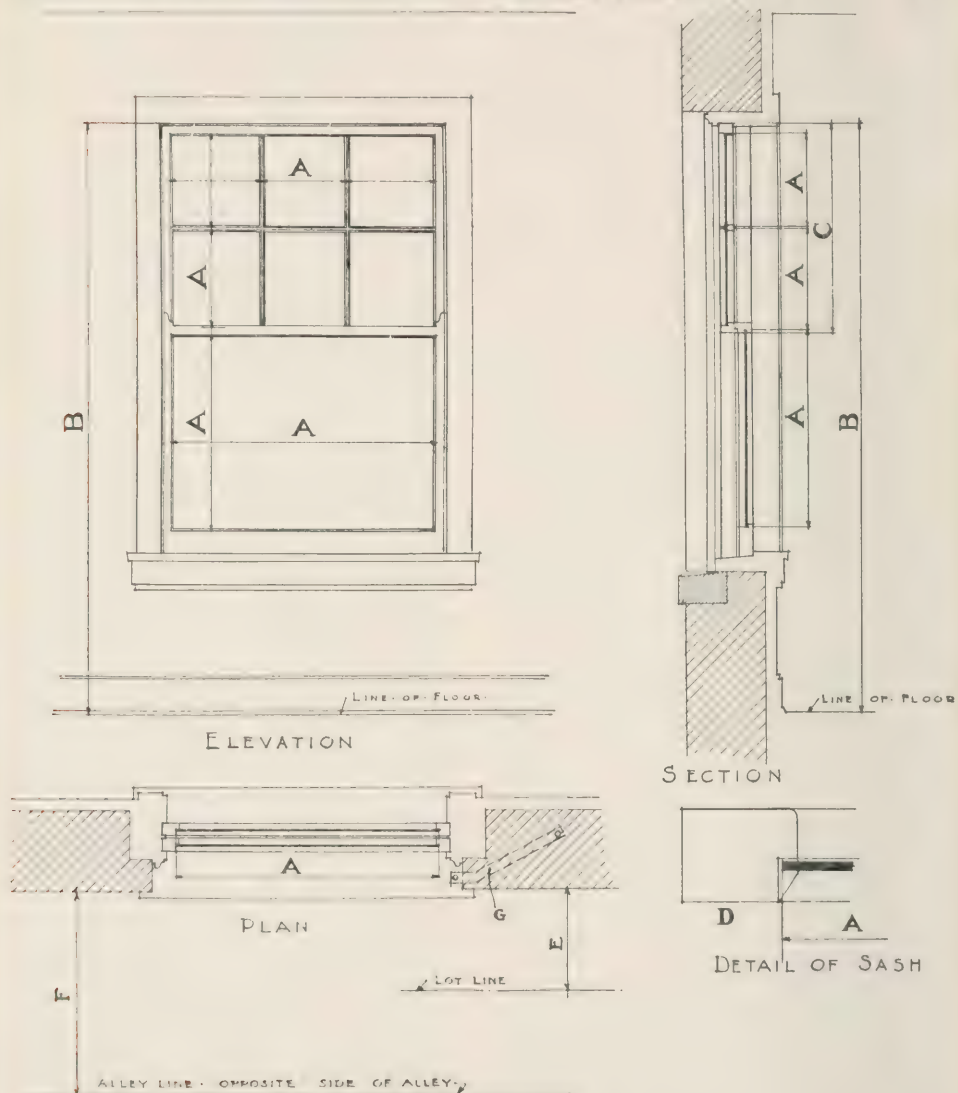


Fig. 2.
WINDOWS.

Sections 470b, 476, 488, 650, 677, 678, 784, 788.

- (A) Where measurement of glass is taken.
- (B) Top of window.
- (C) One-half of window.
- (D) Detail of sash showing where (A) is taken, under ordinary conditions.
- Area of glass would be (A x A).
- Total area would be summation of all (A x A).
- Windows to be constructed so that upper half (C) can be opened.
- (E) If E is less than 15 ft. wide, metal frames and wire glass to be used; and the glazed portion

- of frames to be set with fire resisting glass, as provided in ordinance. (Sec. 784).
- (F) If F is less than 30 ft., metal frames and wire glass to be used; and the glazed portion of frames to be set with fire resisting glass, as provided in ordinance. (Sec. 784).
- For exceptions where steel rolling shutters, etc., are used see ordinance. (Sec. 784a).
- (G) Provision made for safety device in cleaning of windows. (Sec. 788).

(b) In every building hereafter erected for or converted to the purposes of this class, every room used as a private sitting room or as a sleeping room, shall have at least one window which opens directly upon a street, alley, yard or court. The total glass area of such window or windows opening directly upon a street, alley, yard or court shall be not less than one-tenth of the floor area of such room. The top of at least one such window shall be at least seven feet above the floor and at least the upper half of such window shall be capable of being opened. No such window shall have a glass area of less than ten square feet unless it be a window in excess of the one-tenth of the floor area as required by this paragraph. Provided that sleeping cells in prisons, jails, police stations and houses of detention need not have each a window opening directly on a street, alley, yard or court if such cells are in a cell block which has windows with a glass area equal to one-fourth of the floor area of such block and arranged so that each window may be opened for one-half of its area, and provided further that such cell block and cells shall be equipped with a system of mechanical ventilation approved by the Commissioner of Health.

(c) In every building hereafter erected for or converted to the purposes of this class, every pantry, bath room and water closet and urinal compartment shall have at least one window which opens directly upon a street, alley, yard, court or vent shaft; the total glass area of such window or windows opening directly upon a street, alley, yard, court or vent shaft shall be not less than one-tenth of the floor area of such room or compartment. The top of at least one such window shall be at least seven feet above the floor and at least the upper half of such window shall be capable of being opened; and no such window shall have a glass area of less than six square feet or a glass width of less than one foot; provided, however, that such room or compartment, if located in the upper story of any such building, may be lighted and ventilated by means of a skylight having a glass area equal to one-tenth of the floor area of the room it serves and be equipped with an efficient ventilator or ventilators equal in effective area to one-twentieth of the floor area of such room; and provided further, that any such room or compartment in a building used for office, club, hospital or hotel purposes, in lieu of such window or windows, may be ventilated by an approved mechanical ventilation system which shall effect at least six complete changes of air per hour.

(d) In every building hereafter erected for or converted to office, hotel or club purposes, every room, except a room used as a bakery, which is below street grade and which is frequented by the public or in which there are regularly employed five or more persons, shall be ventilated by an approved mechanical ventilating system which shall effect at least six complete changes of air per hour; provided that in case of store rooms below street grade having 1,500 cubic feet of space per person employed therein two changes of air per hour will be deemed sufficient. In buildings of this class every room, either above or below grade, used as a bakery, shall comply with the provisions of the ordinances of the City of Chicago in respect to bakeries.

(e-1) In every building hereafter erected for or converted to the purposes of this class, every room not otherwise specifically provided for in this section where practicable, shall have a window or windows opening directly upon a street, alley, yard or court. The total area of such window or windows shall be not less than 10 per cent of the floor area, and at least one-half of each window shall be made to open.

(e-2) If the total area of the windows is less than one-tenth of the floor area, or if less than 50 per cent of the window is arranged to open, an approved mechanical ventilation supply system shall be installed for the excess floor area, fresh air being supplied at the rate of not less than one and two-tenths cubic feet per minute per square foot of floor area. The supply shall be taken from the outer air at an uncontaminated source through a screened opening at a point not less than 10 feet above street level, except that if an air washer or other cleansing medium, approved by the Commissioner of Health, is installed in connection with the system, the supply need not be taken from this height.

(f) It shall be the duty of the owner, agent, architect, or party in possession or control of any building in which a mechanical system of ventilation shall have been installed under the requirements of this section, upon completion of such system, to notify the Commissioner of Health in writing at least twenty-four hours in advance of the making of a test of such system; and each such system or unit shall be tested for volumetric efficiency by the owner or his representative in the presence of the representative of the Commissioner of Health and such system shall not be considered as meeting the requirements of this section until it shall have been approved by the Commissioner of Health. Every such mechanical ventilating system shall at all times be kept in good repair and in operation so as to insure the required ventilation of all rooms and compartments planned to be ventilated thereby, during all hours of human occupancy.

(g-2) If such reception room or anteroom is located between a corridor and another room or rooms, the partition separating such room from the adjoining room or rooms shall be equipped with transoms or openings (exclusive of doors), equivalent to five per cent of the area of the reception room or anteroom. The window or windows of the adjoining room or rooms shall open on a street, alley, yard or court and shall be at least 10 per cent of the combined floor area of the reception room or anterooms and adjoining room or rooms. The corridor partition separating reception room or anteroom from the corridor shall be equipped with transoms or openings (exclusive of doors), equal to at least two and one-half per cent of the floor area of the reception room or anteroom.

(g-3) If it is impracticable to ventilate any such reception room or anteroom, as aforesaid, such room shall be ventilated by an approved mechanical ventilation supply system which shall supply at least one and two-tenths cubic feet of air per minute per square foot of floor area in the reception room or anteroom. The supply shall be taken from the outer air at an uncontaminated source through a screened opening at a point not less than 10 feet above street level, except that if an air washer or other cleansing medium, approved by the Commissioner of Health, is installed in connection with the system, the supply need not be taken from this height.

(g-4) In all such anterooms or reception rooms in buildings of Class II-a, there shall be not less than 750 cubic feet of space for each person regularly employed therein.

Class IIa.

471. **Class IIa Defined.)** In Class IIa shall be included every building used for office purposes, and also every building used for club house purposes where sleeping accommodations are provided for less than twenty persons.

472. **Buildings—Construction of—Height of.)** (a) Buildings of Class IIa which are ninety feet or more in height shall be built entirely of fireproof construction.

(b) Buildings of Class IIa less than ninety feet and more than fifty feet in height shall be built either of slow-burning, mill or fireproof construction.

(c) Buildings of Class IIa not exceeding fifty feet in height may be built of ordinary construction.

Class IIb.

473. **Class IIb Defined.)** In Class IIb shall be included every building used for hotel, club, lodging or rooming house purposes where such building has sleeping accommodations for twenty or more persons.

474. **Buildings—Construction of—Height of.)** (a) Buildings of Class IIb more than five stories and basement high shall be of fireproof construction.

(b) Buildings of Class IIb more than three stories and basement high but not more than five stories and basement high shall be of slow-burning or fireproof construction. In case slow-burning construction be required the cellar and basement construction, including the floor construction of the first story above the cellar or basement, shall be of fireproof construction.

475. **Walls—Divisions and Partitions—Fire Stops.)** (a) In buildings hereafter erected used wholly, or in part for the purposes of Class IIb of ordinary, slow-burning or mill construction, there shall be for every eight rooms in any one story, dividing walls or partitions of incombustible material separating such eight rooms from the contiguous spaces.

(b) In all buildings hereafter erected to be used wholly or in part for the purposes of Class IIb, all elevators and stairs shall be enclosed in partitions of incombustible or fireproof material, and the partitions of all corridors leading to such elevators and stairs shall be of fireproof or incombustible material. Such partitions shall be carried on self-supporting masonry or a framework of steel or iron. Where glass is used in said partitions, the same shall be wired glass set in metal frames but such glass shall not exceed sixty per centum of the superficial area of said partitions.

(c) In all non-fireproof buildings of Class IIb there shall be between joists a stop of brick, concrete or tile not less than four inches in thickness, extending the full height of joists and spaced not more than twenty-five feet apart, measured in the direction of the length of the joist.

476. **Sleeping Stalls in Rooms—When Allowed.)** Sleeping stalls shall not be constructed or used in any room in any building now existing or hereafter erected and devoted, in whole or in part, to the purposes of a lodging or rooming house unless such room has two or more windows which open directly upon a street, alley, yard or court and which windows have a total area equal to at least one-tenth of the floor area of such room, nor unless the semi-partitions forming such stalls are so constructed that there is a clear and unobstructed interval of at least thirty inches between the top of such semi-partitions and the ceiling of the room, nor unless each such stall shall open directly into an aisle or passageway leading directly to a stairway or stairway fire escape, the location of which is indicated by a red sign and at night by a red light also. Such sleeping stalls shall not be installed in any such room in such numbers that there shall be less than 400 cubic feet of air per person when all stalls are occupied to their full capacity. The semi-partitions forming such stalls hereafter constructed shall be of incombustible material.

(See Illustration Sec. 470b.)

Class IIc.

477. **Class IIc Defined.)** In Class IIc shall be included every building used for a

hospital where sleeping accommodations for more than ten persons are provided in such building and every building used for a home, day nursery or asylum where any such building shall have accommodations for more than twenty persons or where more than ten bedridden or decrepit persons are housed, and every building used for a jail, house of correction or detention.

478. **Buildings—Construction of—Height of.)** (a) All buildings of Class IIc not more than two stories and basement in height may be of ordinary, mill, or slow-burning construction.

(b) All buildings of Class IIc more than two stories and basement in height shall be of fire-proof construction.

479. **Frontage Consents for Hospitals.)** It shall be unlawful for any person, firm or corporation to build, construct, maintain, conduct or manage any hospital in any block in which two-thirds of the buildings fronting on both sides of the street or streets on which the proposed hospital may front are devoted to exclusive residence purposes, unless the owners of a majority of the frontage in such block and the owners of a majority of the frontage on the opposite side or sides of the street or streets on which said building fronts and faces consent in writing to the building, constructing or maintaining, managing or conducting of any such hospital in said block. Such written consents of the majority of said property owners shall be filed with the Commissioner of Health before a permit shall be granted for the building or constructing, or a license be issued for the maintaining, conducting or managing of any such hospital.

480. **Coves in Rooms and Corridors of Hospitals.)** In every building hereafter constructed for or converted to hospital purposes, in all corridors and rooms used by patients, all intersections of walls, floors and ceilings shall be formed with tangent coves.

481. **Elevators in Hospitals.)** Every building over three stories in height hereafter constructed for or converted to hospital purposes shall have at least one elevator, the floor dimensions of which shall be not less than seven feet by five feet, and said elevator shall be enclosed in a fireproof shaft with incombustible doors closing off each opening and shall comply with all the general provisions of this chapter.

482. **Fire Escapes, Balconies, Platforms.)** All buildings of Class IIc shall be equipped with stairway fire escapes not less than three feet in width which shall, in number, location and structural features, comply with the general provisions of this chapter relating to fire escapes. The balconies and platforms of such fire escapes shall be not less than three feet in width and may be made with a smooth surface of incombustible material laid flush with the floor and with a pitch of one-third inch to the foot.

ARTICLE VI.

Class III.

483. **Class III Defined.)** In Class III shall be included every building used as a private residence, also every building used for a hospital where sleeping accommodations for ten or less persons are provided in such building, and every building used for a home, day nursery or asylum where any such building shall have accommodations for twenty or less persons or where not more than ten bedridden or decrepit persons are housed, and also every building, structure or place with a ground area of less than five hundred square feet used as and for the purposes of a barn, stable or garage or for the housing or keeping of automobiles.

484. **Must Comply With General and Special Provisions.)** Every building of Class III shall comply with the provisions of this chapter, and, in addition to the general pro-

visions, shall comply with the following special provisions:

485. Buildings—Construction of—Height of—Space Occupied on Lot.) (a) Every building of Class III which is ninety feet or more in height shall be built entirely of fireproof construction.

(b) Every building of Class III less than ninety feet and more than fifty feet in height shall be built entirely of slow-burning, mill or fireproof construction.

(c) Every building of Class III less than fifty feet in height may be built of ordinary construction.

(d) The amount of space occupied on any lot by Class III buildings shall comply with the requirements of Section 642 of this chapter.

(e) Buildings used for garage purposes only, having a ground area of four hundred (400) square feet or less, may be built with enclosing walls and roof of corrugated iron or galvanized sheet steel supported on a frame of steel construction.

486. Skylights—Construction of—Glass in.) (a) The skylight on the roof of every building of Class III erected within the fire limits shall have its sides, sashes and frames constructed of metal or of metal-clad wood on all exterior surfaces.

(b) Such skylights shall be covered by a strong wire netting with mesh not more than one and one-half inches square placed not less than six inches above the glass, supported on uprights of incombustible material, unless wired glass is used.

487. Allowances of Live Loads in Construction of Floors.) In every building of Class III, the floors shall be designed and constructed in such manner as to be capable of bearing in all their parts, in addition to the weight of the floor construction, partitions, permanent fixtures and mechanisms that may be set upon the same, a live load of 40 pounds for every square foot of surface.

488. Habitable Rooms—Definition of—Requirements as to Size and Ventilation.)

(a) For the purposes of this chapter the term "habitable room" shall be held to include every room in every building of Classes III and VI, and every room in buildings of other classes if such rooms are used for the purposes of Classes III and VI, in which a family or the individual members thereof regularly sleep or eat or carry on their usual domestic or social vocations or avocations. Laundries, bath rooms, water closet compartments, serving and storage pantries, storage rooms and closets, boiler and machinery rooms, cellars, corridors, and similar spaces used neither frequently nor during extended periods, shall not be deemed as coming within the scope of this term.

(b) In every building hereafter erected for or converted to the purposes of Class III, every habitable room shall have a window or windows with a total glass area equal to at least one-tenth of its floor area, opening onto a street, alley, or yard, as defined in Section 634 of this chapter; provided, that there shall be a space of at least three feet between the building and the lot line on one side, and a space of at least one foot between the building and the lot line on the other side. None of such required windows shall have a glass area of less than ten square feet; and each such window shall have its top not less than seven feet above the floor and shall be so constructed that at least its upper half may be opened its full width. No such habitable room shall have a floor area of less than eighty square feet, nor a clear height from floor to ceiling of less than eight feet and six inches; provided that attic rooms need not be eight feet six inches high for more than one-half of their area, and provided further that such attic rooms shall have total cubic contents of not less than seven hundred and fifty cubic feet each.

(c) No living room shall be partitioned off or constructed in any existing building or portion thereof, until plans of such building and room have been filed with, and a permit for such partitioning or constructing obtained from the Commissioner of Buildings and the Commissioner of Health; and every room so partitioned off or constructed shall comply with all the requirements for habitable rooms as contained in this section. (See Illustration Sec. 470b).

489. Alcoves.) Every alcove and alcove room shall comply with the requirements of Section 648 of this chapter.

490. Pantries, Bath Rooms, Water Closet and Urinal Compartments—Requirements in Relation Thereto.) In every building hereafter erected for or converted to the purposes of Class III, every pantry, bath room, water closet or urinal compartment shall have at least one window with a glass area of at least six square feet and a minimum width of at least one foot opening upon a street, alley, or yard as defined in Section 634 of this chapter, or upon a vent shaft not less in area than said window; and no habitable room shall open into or connect with a vent shaft thus used.

491. Bay Windows and Light Shafts—Materials For.) Bay or oriel windows may be built of combustible material on front or rear elevations of buildings of Class III of two stories or less in height, within the fire limits, provided such bay and oriel windows shall not have a greater width than twelve feet at the wall line of the building, and, provided, that the outside walls, roofs and soffits of such bay or oriel windows, when so constructed, shall be covered with sheet metal or other incombustible material. Light shafts wholly within the walls of a two-story building of Class III may be built of combustible material covered with sheet metal or other incombustible material. In all other cases, bay and oriel windows and light shafts and their supports shall be constructed entirely of incombustible material.

492. Walls—Brick Walls Upon Wooden Sills—Level of Sills Allowed.) Every building of Class III not exceeding one story or twenty feet in height from top of sills to the highest point of the roof, and with the side walls not exceeding fourteen feet in height, and with floor area not exceeding twelve hundred square feet, may have brick walls not less than eight inches in thickness erected upon wooden sills, the sills supported on iron, masonry, or concrete supports extending four feet below the surface of the ground, provided that the portion of the supports above the ground may consist of cypress or cedar posts. The foundations under such supports shall be of concrete, stone or brick, each covering not less than five square feet area and not more than eight feet apart, to support with safety the weight that may rest upon them; sills shall be placed not higher than four feet above the established grade of the street upon which the lot fronts and upon which lot the building is erected, where grades are established, and not exceeding seven feet above the ground where grades are not established. Every building more than one story and less than two stories high, having a gable or hip roof with a rise of not more than thirty degrees, may have eight-inch walls of solid brick or stone masonry, provided the side walls do not exceed fourteen feet in height measured from the first floor joist, and provided such building has a floor area not exceeding 1,200 feet and is not over 22 feet in width.

493. Stairways in Buildings of Class III Three Stories or More in Height.) (a) In every building of Class III hereafter erected, and three stories or more in height, there shall be either two stairways from the

first to the top story or one such stairway and a stairway fire escape.

(b) In every building of Class III now in existence, and three stories or more in height with a floor area of 1,000 square feet above the second floor, which is not equipped with two stairways or with one stairway and a stairway fire escape, safe and adequate means of egress from all floors shall be provided by the erection of additional stairways or stairway fire escapes, or such other means as in the judgment of the Commissioner of Buildings are required for the safety of the occupants of such building or the public.

(c) In every building of Class III now in existence or hereafter erected used for hospital, home, day nursery or asylum purposes there shall be provided at least two stairways located as far apart as practicable and extending from the top story to the ground. A separate door exit shall be provided for each stairway to the outside of the building.

ARTICLE VII.

Class IV.

494. **Class IV Defined.)** (a) In Class to in subdivisions herein designated as Class IVa, Class IVb, Class IVc and Class IVd, as follows:

(b) In Class IVa shall be included every building used as a church or place of worship.

(c) In Class IVb shall be included every building having a parish hall, lodge hall, dance hall, banquet hall, skating rink, assembly hall, halls used for the purpose of exposition and exhibition, and buildings having a hall for the purpose of instruction, other than schools, included in Class VIII, and also every existing building having a hall used for theatrical purposes at the time of the passage of this ordinance, except such buildings as are included in Classes IVa, IVc, IVd, and V.

(d) Class IVc shall include every building hereafter erected used for moving picture and vaudeville shows and similar entertainments, where an admission fee is charged and regular performances are given, and where the seating capacity does not exceed three hundred; provided, that every building of Class IVc existing at the time of the passage of this ordinance shall comply with the provisions of Class IVb.

(e) In Class IVd shall be included every grandstand and every baseball, athletic and amusement park.

(f) In Class IVe shall be included every building hereafter erected having an arena, amphitheater or enclosed stadium for the purpose of exposition and exhibition where the seating capacity of such building shall exceed 40,000 persons. Where any building coming under this class has a seating capacity of less than 40,000 persons it shall be built to conform to the provisions of Class IVb.

495. **Must Comply With General and Special Provisions.)** Every building or structure of Class IV shall comply with the general provisions of this chapter and shall, in addition, comply with the following special provisions:

496. **Must Comply With All Ordinances.)** It shall be unlawful for any person, firm or corporation to construct or alter any Class IV building except in conformity with the ordinances of the City of Chicago relative thereto, or to operate any Class IV building that does not conform thereto.

497. **City Officials Empowered to Enter.)** The Commissioner of Buildings, Commissioner of Health, Commissioner of Gas and Electricity, Fire Commissioner, Chief Fire Prevention Engineer, Superintendent of Police, and their respective assistants, shall have the right to enter any build-

ing used in whole or in part for the purposes of Class IV at any reasonable time, and at any time when occupied by the public, in order to examine such building, and it shall be unlawful for any person to interfere with them in the performance of their duties.

498. **City Officials Empowered to Close.)** The Commissioner of Buildings, Commissioner of Health, Fire Commissioner, Chief Fire Prevention Engineer, Commissioner of Gas and Electricity, Superintendent of Police, or any one of them, shall have the power, and it shall be their joint and several duty, to order any building used wholly or in part for the purposes of Class IV, to be closed, where it is discovered that there is any violation of any of the provisions of this chapter, and kept closed until the same are complied with.

499. **Theaters in Frame Buildings Prohibited.)** No frame building or part thereof shall be used as a moving picture, vaudeville or other theatre.

500. **Buildings—Height—Construction—When Used in Part as Class IV.)** Every building higher than sixty feet, used in whole or in part for the purposes of Class IV or connected with or made part of any building so used, shall be entirely of fireproof construction. Every such building less than sixty feet in height shall be made of fireproof, slow-burning or mill construction, except as provided in this chapter.

CLASS IVa

501. **Class IVa Defined.)** In Class IVa shall be included every building used as a church or place of worship.

502. **Frontage—Seating Less Than Eight Hundred.)** Every building of Class IVa hereafter erected containing an aggregate seating capacity of 800 persons or less, shall have for the auditorium a frontage upon two open spaces, of which at least one shall be a street, and the other, if not a street, shall be a public or private alley, not less than ten feet wide, opening directly on a public street or alley.

503. **Frontage—Seating Over Eight Hundred.)** Every building of Class IVa hereafter erected containing an aggregate seating capacity greater than eight hundred persons, shall have a frontage upon three open spaces of which at least one shall be a public street and the others, if not streets, shall be public or private alleys of a width of not less than ten feet each, opening directly on a public street or alley, with at least one exit into each open space.

504. **Construction of.)** Every building of Class IVa, which has a seating capacity of less than 600 may be built of ordinary construction. Every building Class IVa having a seating capacity of more than 600 and less than 1,800 shall be built of slow-burning mill or fireproof construction.

505. **Fireproof Construction Necessary When.)** Every building of Class IVa having an aggregate seating capacity greater than 1,800 persons shall be built of fireproof construction.

506. **Limitations of Floor Level in Class IVa—Height Above Sidewalk.)** (a) The limitations of floor levels in buildings hereafter erected, occupied either wholly or in part for the purposes of Class IVa, shall be as follows:

(b) No auditorium of a greater seating capacity than 1,000, shall have the highest part of its main floor at a greater distance than 10 feet above the adjacent sidewalk grade. No room or rooms having a greater seating capacity than five hundred shall be at a greater distance above the sidewalk grade than twenty feet. No room or rooms used for the purposes of Class IVa having a greater seating capacity than two hundred

shall be at a higher level above the sidewalk grade than thirty feet; provided, however, that in the case of a building used either wholly or in part for the purposes of Class IVa, and built of fireproof construction, a room or rooms to be used for the purposes of Class IVa and of an aggregate seating capacity of less than five hundred may be located in any story thereof, but in such case, there shall be at least two separate and distinct flights of stairs from the floor or floors in which such room or rooms are located, to the ground, each of which stairs shall be not less than 4 feet wide in the clear and shall be equipped with emergency exits and not less than one stairway fire escape.

507. Allowance for Live Loads in Construction of Floors in Buildings of Class IVa—Stairways—Width of Entrances and Exits.) Every floor in buildings of Class IVa shall be designed and constructed in such a manner as to be capable of bearing in all its parts, in addition to the weight of floor construction, partitions, and permanent fixtures that may be set upon same, a live load of 100 pounds for every square foot of surface on such floor. The width of stairways in buildings of this class shall be twenty inches for every one hundred of the aggregate seating capacity, and for fractional parts of one hundred seating capacity, a proportionate part of twenty inches shall be added to the width of such stairway, but no stairway in such building shall be less than four feet wide in the clear, except as hereinafter provided, and provided that in any such building having a gallery, the seating capacity of which does not exceed two hundred and fifty persons, two separate and distinct stairways, each not less than three feet wide, shall be permitted.

508. Galleries—Exit and Entrance.) Distinct and separate exits shall be provided for each gallery. A common place of exit and entrance may serve for the main floor of the auditorium and the gallery or galleries, provided its capacity be equal to the aggregate capacity of all aisles or corridors leading from the main floor and such gallery or galleries to such place of exit or entrance. Not more than two galleries, placed one above the other, shall be permitted in any building of Class IVa.

509. Width of Aisles—Steps in Aisles.) Aisles in buildings of Class IVa shall, in the aggregate, be eighteen inches in width for each 100 of the seating capacity of the auditorium, and for fractional parts of 100 a proportionate part of 18 inches shall be added, but no aisle shall be less than two feet six inches in width in its narrowest part. Steps shall be permitted in aisles only as extending from bank to bank of seats, and whenever the rise from bank to bank of seats is less than 5 inches, the floor of the aisles shall be made on an inclined plane; and where steps occur in outside aisles or corridors, they shall not be isolated, but shall be grouped together, and there shall be a light so placed as to illuminate such steps in such outside aisles or corridors.

510. Corridors, Passageways, Hallways and Doors—Width of.) The width of corridors, passageways, hallways and doors, adjacent to, connected with, or a part of the auditorium, shall be computed in the same manner as is herein provided for stairways and aisles, excepting, however, that no such corridor, passageway or hallway shall be less than four feet in width, and no such doorway shall be less than three feet in width.

511. Seats, Number of, in Rows.) There shall not be more than fourteen seats in any one row between aisles. Rows of seats shall not be less than two feet eight inches from back to back, and no bank of seats shall be of greater rise than twenty inches.

512. Emergency Exits—All Doors to Open Outward.) (a) Emergency exits and outside stairways shall be provided for every building of Class IVa, which has a larger seating capacity than 800. Such emergency exits shall be one-half the aggregate width of the main exits, but no such emergency exits shall be less than three feet in width. Provided, that such stairways may be built inside the walls of the building in a corridor or passageway not less than seven feet wide and enclosed by a fireproof partition not less than four inches thick. Such stairway shall be of fireproof construction. All emergency exits and stairways therefrom shall be kept free from obstructions of any kind including snow and ice.

(b) All doors affording egress, directly or indirectly from the auditorium to a street or alley, shall open outward. Exit doors shall not be obscured by draperies and shall not be locked or fastened in any manner during the time that the building is occupied, and shall be so constructed and maintained that they may be easily opened from within.

513. Buildings in Which Seats are Not Fixed—Seating Capacity.) In computing the seating capacity of any room or building used for the purposes of this class in which the seats are not fixed, an allowance of six square feet of floor area shall be made for each person, and all space between the walls or partitions of such room or building shall be measured in this computation. Provided that in buildings of Class IVa standing at least seven feet from any other building and not having more than two stories and each floor having its own separate exits, the seating capacity of such floor shall be estimated alone as determining the kind of construction under this article.

514. Lighting Service Requirement.) Gas or electricity or both may be used for illuminating purposes in buildings of Class IVa. Provisions shall be made to properly light every portion of a building of Class IVa and every outlet therefrom leading to the outside of the building, and all open courts, passageways and emergency exits. Lights in vestibules, halls, corridors, passageways, stairways and other means of egress from the building and premises shall be on an independent system or circuit or service and shall be controlled separately and exclusively by a switch or a shutoff located near the main entrance. In rooms, halls and auditoriums used for the purpose of Class IVa provisions shall be made to furnish a light above, if possible, otherwise closely adjoining every opening to an exit or emergency exit from the room, hall or auditorium. Where the capacity of the room, hall or auditorium is 400 or less provisions shall be made to supply such light with either gas or electricity. Where the capacity of the room, hall or auditorium is greater than 400 provisions shall be made to supply such light by gas only.

Class IVb.

515. Class IVb Defined.) In Class IVb shall be included every building having a parish hall, lodge hall, dance hall, banquet hall, skating rink, assembly hall, halls used for the purpose of exposition and exhibition, and buildings having a hall for the purpose of instruction, other than schools, included in Class VIII, and also every existing building having a hall used for theatrical purposes at the time of the passage of this ordinance, except such buildings as are included in Classes IVa, IVc, IVd, IVe and V.

516. Frontage—Seating Eight Hundred or Less—Seating More than Eight Hundred.) (a) Every building of Class IVb, containing a hall or halls of an aggregate seating capacity of 800 persons or less,

shall have a frontage upon two public spaces, of which at least one shall be a street, and the other, if not a street, shall be a public or private alley, not less than ten feet wide, opening directly on a public street or alley.

(b) Buildings of Class IVb, containing halls or rooms, used for the purpose of Class IVb, of greater aggregate seating capacity than 800, shall have a frontage upon three open spaces, of which at least one shall be a public street, while the other two, if not streets, shall be public or private alleys, of a width of not less than ten feet, each opening directly on a public street or alley; provided that a fireproof passageway at grade level, and not less than seven feet in width may be used in place of one such alley, if such passageway connects with a public thoroughfare.

517. Auxiliary Buildings—Height and Construction of—Communicating Doors.) (a) Every building hereafter erected and connected with or made part of any building used in whole or in part for the purposes of Class IVb, shall, if sixty or less feet in height, be of fireproof, mill or slow-burning construction, except as otherwise provided in this chapter, and, if more than sixty feet in height, of fireproof construction.

(b) No existing building, other than of fireproof construction, shall be connected to any building of Class IVb now existing or hereafter constructed, unless there is, between such buildings, a fire wall constructed as required by Section 732 of this chapter and extending from the ground to and through the roof.

(c) In all such cases where both buildings are not of fireproof construction, each opening in the intervening walls shall be equipped with automatic double fire-doors as required by Section 789 of this chapter.

518. Existing Buildings—Used for Class IVb and for Other Purposes.) No part of an existing building, other than of fireproof construction shall be used for the purposes of Class IVb unless such part is separated from all portions of the same building used for other purposes by a fire wall constructed as required by Section 732 of this chapter and extending from the ground to the roof and unless all openings in such fire wall are equipped with automatic double fire doors as required by Section 789 of this chapter; in which case such other portions may be constructed in the manner permitted for separate buildings of such class.

519. Construction—Depending on Capacity.) Every building used for the purpose of Class IVb, hereafter erected, containing a hall or room of an aggregate seating capacity of not more than 1,500 persons, shall be built of mill, slow-burning or fireproof construction. Every building hereafter erected to be used for theatrical purposes with a seating capacity greater than three hundred shall be built to conform to the requirements of buildings of Class V hereafter erected. If a hall or room or halls or rooms have a total seating capacity of more than 1,500 persons, such building shall be built of fireproof construction; provided, that buildings mainly used for exposition or exhibition purposes, and not used for theatrical purposes, and not exceeding two stories in height which have for public use only a main floor and one gallery and which have their walls and structural members of incombustible material and which comply with the provisions of this ordinance as to stairways, exits and fire escapes, may have their temporary seats, boxes, show cases, platforms, or booths, constructed of combustible material; provided, however, that any and all draperies, bunting, or other inflammable decorations shall be treated with a fire-retarding solution, subject to the

approval of the Chief Fire Prevention Engineer.

520. Buildings in Which Seats Are Not Fixed—Seating Capacity.) In computing the seating capacity of any room or building used for the purposes of this Class, in which the seats are not fixed, an allowance of six square feet of floor area shall be made for each person, and all space between the walls or partitions of such room or building shall be measured in this computation. Provided, that in buildings of Class IVb standing at least seven feet from any other building and not having more than two stories and each floor having its own separate exits, the seating capacity of each floor shall be estimated alone as determining the kind of construction under this article.

521. Limitations of Floor Levels—Height Above Sidewalks—Skating Rinks.) (a) The limitations of floor levels in buildings hereafter erected, occupied either wholly or in part for the purposes of Class IVb, other than skating rinks, shall be as follows: No auditorium of a greater seating capacity than one thousand shall have the highest part of its main floor at a greater distance than fourteen feet above the adjacent sidewalk grade. No room or rooms having a greater seating capacity than five hundred shall be at a greater distance above the sidewalk grade than twenty feet. No room or rooms used for the purposes of Class IVb having a greater seating capacity than two hundred shall be at a higher level above the sidewalk grade than thirty feet; provided, however, that in the case of a building used either wholly or in part for the purposes of Class IVb, and built of fireproof construction, a room or rooms to be used for the purposes of Class IVb and of an aggregate seating capacity of less than five hundred may be located in any story thereof, but in such case, there shall be at least two separate and distinct flights of stairs from the floor or floors in which such room or rooms are located, to the ground, each of which stairs shall be not less than four feet wide in the clear and such floor or floors shall be equipped with emergency exits and have not less than one stairway fire escape.

(b) In buildings of fireproof construction hereafter erected, banquet halls, ballroom halls, or society halls having a seating capacity of not more than 900 and lodge halls having an aggregate seating capacity of not more than 900 may be located on any floor. Such banquet halls, ballroom halls, society halls and lodge halls shall have access to at least two interior stairways and not less than one stairway fire escape, the combined width of which shall be equal to at least eighteen (18) inches for each 100 persons for whom accommodations are provided in said banquet halls, ballrooms, society halls, or lodge halls.

In buildings of fireproof construction hereafter erected, banquet halls, lodge halls, society halls or drill halls used for lodge purposes, having a seating capacity of not more than 1800, may be located on any floor eighty feet or more above the adjacent sidewalk grade, where all parts of said building above such height are used exclusively for lodge or society purposes. Such banquet halls, lodge halls, society halls, or drill halls shall have access to at least four interior stairways, and not less than four stairway fire escapes, the combined width of which shall be equal to at least eighteen inches for each 100 persons for whom accommodations are provided in said banquet halls, lodge halls, society halls, or drill halls. Where an interior stairway in such a building is enclosed in a tower and built as required by the provisions of Section 881, paragraph (b) of this chapter, then such stairway shall be considered the equivalent in "Width of Stairs" of two open stairways, or an open stairway and a fire escape. Drill halls used for lodge purposes, having a main floor seating capacity of not more than 1800 may, in

addition, have a spectators' balcony having a seating capacity not to exceed 500. Such spectators' balcony shall have at least two interior stairways, not less than four feet wide, and at least two exterior fire escapes, not less than three feet wide, and shall be in accordance with provisions of Sections 524 to 529, both inclusive, of this chapter. Where adjoining buildings, or buildings on opposite sides of an open space, used for the same purposes, or for office purposes, and operated by the same persons, firm or corporation, are connected on each floor by enclosed fireproof bridges or passageways with fireproof doors at each end of bridge or passageway, or by fireproof vestibules with doors built and equipped as required by this chapter for dividing wall doors, then said bridge or passageway, or vestibule, may be considered to be equivalent to a stairway for each of the two areas.

(c) No room or hall used for the purposes of a skating rink shall be constructed, operated or maintained with its main floor level more than two feet above the inside sidewalk grade of the street upon which such building containing same fronts, or more than one foot above the ground level in front of such building when it does not face upon a street, or more than one foot below the inside sidewalk grade of the street upon which such building fronts, or more than one foot below the ground level in front of such building when it does not face upon a street.

522. Allowance for Loads in Construction of Floors.) All floors of all buildings of Class IVb shall be designed and constructed in such a manner as to be capable of bearing in all their parts, in addition to the weight of floor construction, partitions, permanent fixtures and mechanisms that may be set upon the same, a live load of one hundred pounds for every square foot of surface in such floor, in accordance with the general provisions of this chapter.

523. Stairways—Entrances and Exits—Handrails—Width of.) The width of stairways in buildings used wholly or in part for the purposes of Class IVb, shall be 18 inches for every 100 persons of the aggregate seating capacity of all rooms used for the purposes of Class IVb in such buildings; but no stairway in such building shall be less than four feet wide in the clear; provided, that in any such building having a room or rooms, balcony or gallery, used for the purposes of Class IVb, the aggregate seating capacity of which does not exceed 250 persons, two separate and distinct stairways, each three feet wide, shall be permitted, but no such building hereafter erected shall have less than two interior stairways of the width required by this ordinance, and located as far apart as practicable. Every hall or room used for the purposes of Class IVb in a building hereafter erected, shall have access to not less than two stairways. Every stairway shall have handrails on each side thereof; stairways which are over seven feet wide shall have double intermediate handrails with end newel posts at least five and a half feet high; no stairway shall ascend a greater height than 13 feet 6 inches without a level landing, which landing shall be not less than four feet wide measured in the direction of the run of the stairs. Every stairway leading to a box or boxes shall be independent of all other stairs or seats; and such stairway shall not be less than 2 feet 6 inches wide in the clear when such box or boxes seat not to exceed thirty people, and an additional width of one inch shall be added to such stairway for each additional five persons for whom seating capacity is provided.

524. Balconies and Galleries—Designation of.) Where there are balconies or galleries, the first balcony or gallery shall be designated "balcony" and the second and third balconies or galleries shall be designated respectively "gallery" and "second gallery."

525. Balconies and Galleries—Exit and Entrance.) Distinct and separate places of exit and entrance shall be provided for each gallery. A common place of exit and entrance may serve for the main floor of the auditorium and the balcony, provided its capacity be equal to the aggregate required capacity of all aisles or corridors leading from the main floor and such balcony to such place of exit and entrance.

526. Aisles—Steps in Aisles—Passageways—Cross Aisles Leading to Emergency Exits.)

(a) Aisles in rooms used for the purposes of Class IVb shall have in the aggregate a width of 18 inches for each 100 of the seating capacity of such room, and for fractional parts of 100 a proportionate part of 18 inches shall be added; but no aisle shall be less than two feet six inches in width.

(b) Steps shall be permitted in aisles only as extending from bank to bank of seats, and whenever the rise from bank to bank of seats is less than five inches the floor of the aisles shall be made as an inclined plane, and where steps occur in outside aisles or corridors, they shall not be isolated, but shall be grouped together, and there shall be a light so placed as to illuminate such steps in such outside aisles or corridors.

527. Corridors, Passageways, Hallways and Doors—Width of.) The width of corridors, passageways, hallways and doors adjacent to, connected with or a part of such rooms, shall be computed in the same manner as is herein provided for stairways and aisles, excepting, however, that no such corridor, passageway or hallway shall be less than four feet in width, and no such door shall be less than three feet in width.

528. Seats—Number in Rows.) There shall be not more than fourteen seats in any one row between aisles, and in a room or rooms used for the purposes of Class IVb, of a seating capacity greater than 400 persons, there shall be an aisle on each side of any bank of seats, where there are over seven seats in a row. Rows of seats shall not be less than thirty-two inches from back to back and no bank of seats shall be of a greater rise than twenty inches.

529. Emergency Exits.) (a) Emergency exits and stairways shall be provided outside of any and all rooms used for the purposes of Class IVb which have a seating capacity larger than eight hundred, and such emergency exits shall have a width equal to one-half of the width provided for the main exits and such emergency exits shall lead directly to a public thoroughfare. Provided, however, that any room or rooms used for the purposes of Class IVb in any building hereafter erected, having a seating capacity of more than 400, shall have emergency exits outside of the walls of such building equal in width to one-half of the exits required for the main exits, and such emergency exits shall lead directly to a public thoroughfare. Doors leading to emergency exits shall not be less than three feet wide. Stairs shall not be less than four feet wide. Such emergency exits and stairways may be built inside the walls of such building of a width not less than four feet, provided that they are enclosed by a fireproof partition not less than 4 inches thick; and provided further, that the stairs themselves are constructed of incombustible material. Emergency stairways may descend into open spaces or passageways, provided they do not obstruct more than one-half of the width of such open spaces or passageways.

(b) Every stairway fire escape shall be located and constructed in accordance with the requirements of Sections 881, 882 and 885, but in no case shall any room used for the purposes of Class IVb located above the third story of any building have less than one stairway fire escape.

530. Doors to Open Outward.) All doors affording access directly or indirectly to the

street, alley or corridor from any room used for the purposes of Class IVb shall open outward.

531. Walls Between Auditorium and Stage.) There shall be a solid brick wall of the same thickness as required for outside walls between the auditorium and stage in buildings hereafter erected for or converted to the use of Class IVb and used either wholly or in part for that purpose; and in existing non-fireproof buildings such wall must extend to a height of three (3) feet above the roof. Provided, however, that in existing buildings any room used for the purposes of Class IVb on or before March 13, 1911 having a greater seating capacity than four hundred (400) shall have a proscenium wall built of masonry or incombustible material.

532. Curtain Shall Be of Iron, Steel or Asbestos—Inspection of—Fee.) The main curtain opening in any such room shall have a wrought iron or steel or three-ply asbestos curtain with a wire mesh imbedded therein, which shall be inspected by the Department of Building semi-annually, for which inspection a charge of five dollars shall be made, and all other openings in the proscenium wall shall have self-closing iron doors.

533. Structures Over Ceiling—Construction.) If any structure intended to be occupied by people is built over the ceiling of any room, used wholly or in part for the purposes of Class IVb, the girders or trusses supporting the same shall be of steel protected with fireproofing as required for interior columns in Section 839.

534. Standpipe and Hose on Stage.) In every room used for the purpose of Class IVb and having a seating capacity of 250 or more, and where scenery is used, a standpipe with hose connection and hose shall be installed on each side of the stage under the direction of the Chief Fire Prevention Engineer.

535. Vents of Flue Pipes.) (a) One or more vents of flue pipes of metal construction or other incombustible material approved by the Commissioner of Buildings shall be built over the stage, and shall extend not less than ten feet above the highest point of the roof, and shall be equivalent in area to one-twentieth of the area of the stage.

(b) In buildings where additional stories are built above the stage, such vents or flue pipes may be carried out near the top of the stage walls, and shall be continued and run up on the exterior of the building to a point five feet above the highest point of the additional stories.

(c) All such flues or vents shall be provided with metal dampers which shall be controlled or operated by a small tarred hempen cord and also by two electric switches, one at the electrician's station on the stage, which station shall be fireproof, and the other at the stage fireman's station on the opposite side of the stage; the arrangement of said cord and said electric switches shall be such that the cord will operate as a fusible link between the electric control and the damper and will release said damper, should the switches, or either of them, fail to operate. Such stations shall be located in such places on the stage as may be determined by the Fire Commissioner, subject to the provisions of this paragraph, and each switch shall have a sign with plain directions as to the operation of the same printed thereon.

536. Fuse Boxes.) Every fuse box shall be surrounded by two thicknesses of fireproof material with an air space between, and no fuse shall be exposed to the air between the switchboards; all electrical equipment in such rooms shall be installed and maintained to the satisfaction and ap-

proval of the Commissioner of Gas and Electricity.

537. Capacity—Certification for License.) (a) The Commissioner of Buildings shall determine the number of persons which every room used for the purposes of Class IVb may accommodate according to the provisions of this chapter, and shall certify the same to the City Clerk.

(b) No amusement license shall be issued for any room used for the purposes of Class IVb until the Commissioner of Buildings shall first have certified, in writing, that such room complies with the provisions of this chapter in every respect.

538. Lighting Service Requirement. Gas or electricity or both may be used for illuminating purposes in buildings of Class IVb but the use of gas is prohibited in that part of the building known as the stage side of the proscenium wall. Provisions shall be made to properly light every portion of a building of Class IVb and every outlet therefrom leading to the outside of the building, and all open courts, passageways and emergency exits. Lights in vestibules, halls, corridors, passageways, stairways and other means of egress from the building and premises shall be on an independent system or circuit or service, and shall be controlled separately and exclusively by a switch or a shutoff located near the main entrance. In rooms, halls and auditoriums used for the purposes of Class IVb provisions shall be made to furnish a light above, if possible, otherwise closely adjoining every opening to an exit or emergency exit from the room, hall or auditorium. Where the capacity of the room, hall or auditorium is 400 or less provisions shall be made to supply such light with either gas or electricity. Where the capacity of the room, hall or auditorium is greater than 400 provisions shall be made to supply such light by gas only.

539. Scenery—Definition—Movable Scenery.) (a) "Scenery" as used in this chapter shall include all scenery, drop curtains and wings which are constructed or made of cloth, canvas or combustible material, whether stationary or movable.

"Movable scenery" shall include all scenery, drop curtains, borders and wings which are made movable for the purpose of changing scenery and substituting another set during or between the various stage acts.

540. Scenery to be Non-Inflammable.) All scenery or stage paraphernalia of any sort used upon the stage of any room used for the purpose of Class IVb shall, previous to such use, be treated with a fireproof solution and shall be tested and approved by the Chief Fire Prevention Engineer.

541. Amount of Scenery Allowed—Sprinkler System.) Two sets of house scenery and three drops, exclusive of asbestos fire curtain and picture screen shall be allowed in existing rooms used for theatrical purposes in buildings of Class IVb where the same are on the first floor level, or in a building of fireproof construction or which conformed with the requirements of fireproof buildings at the time same was erected, and the same shall also be allowed in such existing rooms used for theatrical purposes above the first floor level when the seating capacity of such room does not exceed 300. Such scenery shall be known and designated upon the licenses issued by the city as "Permanent House Scenery," and the use and moving of such scenery shall not be construed as placing said building, hall, room or theater within the provisions of the ordinance relating to Class V buildings.

A set of house scenery as contemplated by this section is hereby defined to mean sufficient scenery to make one stage setting, such scenery being in continuous use in such house; provided, however, that the low-

ering of a drop shall not constitute a new stage setting.

No other scenery except as above enumerated shall be permitted on, above or underneath the stage.

Every existing Class IVb theatre affected by this section shall be equipped with an approved sprinkler system and also with stand-pipe and hose subject to the approval of the Chief Fire Prevention Engineer.

No Class IVb theatre in existence on March 13, 1911 affected by this section shall increase its seating capacity beyond its capacity on July 22, 1912.

No scenery or stage paraphernalia of combustible materials shall be used on the stage of any room or theatre used for the purposes of Class IVb, unless such scenery and paraphernalia shall have been treated with a paint or chemical solution which shall make it non-inflammable, and all such treated scenery or stage paraphernalia, or both, shall be tested and approved by the Chief Fire Prevention Engineer.

542. Dressing Room Partitions.) Partitions forming dressing rooms, except where already built, shall be constructed of incombustible material, and such dressing room shall be properly ventilated, as in the judgment of the commissioner of health may be required.

CLASS IVc.

543. Class IVc Defined—Moving Picture and Vaudeville Shows—Seating Capacity.) Class IVc shall include every building hereafter erected used for moving picture or vaudeville shows and similar entertainments, where an admission fee is charged and regular performances are given, and where the seating capacity does not exceed three hundred, provided that every building of Class IVc existing at the time the passage of the ordinance known as The Chicago Code of 1911 shall comply with the provisions of Class IVb. All buildings hereafter erected for moving picture and vaudeville shows and similar entertainments, where an admission fee is charged and regular performances are given, with a seating capacity of over three hundred, and for the exhibition of moving pictures only, where the seating capacity is more than one thousand, shall be built to conform with the requirements for buildings of Class V hereafter erected as contained in this chapter. Buildings for the exhibition of moving pictures only and with a seating capacity of over three hundred, but not to exceed one thousand, shall also be built to conform with the requirements for buildings of Class V hereafter erected, in all their structural requirements and equipment except in so far as such requirements and equipment are modified in Sections 544 and 545 hereof.

544. Frontage of Class IVc—Frontage, Open Spaces and Fireproof Passageways of Moving Picture Theatres Containing a Seating Capacity of more Than Three Hundred.) Every room used for the purposes of Class IVc shall have a frontage upon at least two public thoroughfares, of which at least one shall be a street, and the other a street or a public or private alley not less than ten feet wide and opening directly on a public street or alley.

Buildings for the exhibition of moving pictures only, with a seating capacity of over three hundred but not to exceed one thousand, shall be located so that they adjoin at least two public thoroughfares, one of which shall be a public street and the other may be a public alley not less than ten feet in width. Except as hereinafter otherwise provided, the audience room of such building shall have either a public thoroughfare or an open space unobstructed from the ground to the sky on each side thereof. Such open space, when the audience room has a capacity not to exceed six hundred seats, shall be five feet wide, and six inches shall

be added to the width of same for every side additional one hundred seats in said audience room up to the maximum of one thousand seats. In all cases where there is a public alley in the rear of such building, said open space must connect directly with the alley. In case the entire audience is seated on the ground level said open spaces shall extend alongside of the audience room so as to connect with exit doors placed approximately in the middle of the audience room between the opposite ends of same. Where there is a balcony or gallery installed, such open spaces must extend along the entire length of the audience room so as to connect with exits from the balcony or gallery at their highest and lowest levels. Where such a building is located on a corner lot and adjoins a public street on one side and a public street or an alley not less than ten feet wide on two of the remaining sides and the building is so located that it adjoins such public thoroughfares on three sides for its entire extent, it shall not be necessary to construct an open space on the remaining side thereof, but in all such cases there shall be either an open space unobstructed from the ground to the sky or a fireproof passageway at least five feet wide leading from the side of the audience room not bordering on a street or other public space to the street in front of the theatre and another leading to the alley or other public space in the rear of the theatre. If the seating capacity of such theatre is over six hundred, six inches shall be added to the width of such open space or passageway for every one hundred seats or fraction thereof in excess of six hundred and up to the maximum of one thousand. If access to the street and alley or other public space as herein provided is by means of a fireproof passageway, such fireproof passageway must be constructed in all respects according to the provisions of Section 610 except as herein otherwise provided.

545. Construction.) Buildings of Class IVc hereafter erected, of a seating capacity not to exceed three hundred, shall not be built more than thirty feet in height and may be built of ordinary construction, but the enclosing walls shall be constructed of masonry. No moving picture, vaudeville or theatrical show shall hereafter be installed in a frame building. No room or hall used for the purposes of Class IVc shall hereafter be installed underneath any living or sleeping room.

Buildings for the exhibition of moving pictures only with a seating capacity of more than three hundred but not to exceed one thousand, when the same shall be located as provided for in Section 544 hereof, may be built as herein provided. Said buildings shall contain no stage, proscenium wall nor scenery of any description. The screen for the display of the pictures must be attached to the rear wall of the building, not to exceed six inches away from same. No decorative walls or paintings or other effects shall be constructed inside the audience room in such a manner as to allow any rooms or spaces between same and the enclosing walls of the building. An open platform not to exceed seventy-two square feet in area may be built before the picture screen in moving picture theaters having a seating capacity of not more than three hundred, and the said platform may have an additional twenty-four square feet in area for each additional one hundred in seating capacity in excess of three hundred. On the main floor of such building there shall be at least two main aisles with direct exits at front and rear and two cross aisles with direct exits from the side. When such building contains a balcony or gallery there shall be emergency exits from the highest and lowest levels of same on one side and on the other side there shall be either emergency exits or enclosed interior stairs from the

highest level of the balcony, and the lowest level of the balcony shall be connected with such side stairs by means of a tunnel. All seats in the audience room shall be at least twenty inches wide and space thirty-four inches from back to back. The booth for the moving picture machine must be of construction in conformity with the requirements for such machine booths in buildings of Class IVc; in all other respects such buildings shall comply both in structural requirements and equipment with the provisions of this chapter relating to theatres of Class V hereafter erected.

Provided, however, that where such building has no balcony or gallery and the seats in the audience room are all on the ground floor of same, and where no portion of the building connected with or made a part of or used in conjunction therewith exceeds two stories in height, and where the lobbies and entrances leading to such part of the building used for purposes of Class IVc have brick dividing walls separating them from the portions of the building connected therewith used for the purpose of any other class as defined in this ordinance, and the floors of said lobbies and entrances and the floors and ceilings above such lobbies and entrances are of fireproof construction and there are no doors or windows leading from such lobbies and entrances to any portion of the said building used for any other purpose than Class IVc, such portion of said building as is not used for purposes of Class IVc may be built in accordance with the provisions of this chapter designating the manner of construction for such classes.

546. Floor Levels—Limitations.) The following limitations of floor levels shall apply to every building used for the purposes of Class IVc; the highest part of the auditorium floor shall not exceed four feet above the sidewalk level. The floor level at the entrance shall not be at a greater height than eight inches above the sidewalk. The aisles shall not have a greater incline than $1\frac{1}{2}$ inches to the foot.

547. Stairways—Handrails. Where external stairways are required, such stairways shall be at least six inches wider than the exits, and shall have treads not less than ten inches wide and risers not more than 8 inches high, and shall be provided with suitable handrails on each side thereof, and the width of such stairs shall comply with the requirements of Class IVc.

548. Balconies and Galleries.) In non-fireproof buildings hereafter erected for, or converted to the purposes of Class IVc, not more than one balcony and no galleries shall be constructed.

549. Width of Aisles—Steps in Aisles.) Aisles and rooms used for the purpose of Class IVc shall have in the aggregate a width of not less than twenty inches for each 100 of seating capacity of such room and for fractional parts of 100 a proportionate part of twenty inches shall be added, and no aisles shall have a width of less than two feet six inches. When side emergency exits are permitted, there shall be a cross aisle not less than three feet wide, leading directly to said exit. Steps shall not be permitted in any aisle or in any portion of the auditorium floor.

550. Corridors — Passageways — Doors — Width Of.) The width of corridors, passageways and doors shall be computed in the same manner as provided in Sections 526 and 527.

551. Seats—Size—Location.) There shall not be more than ten seats in any one row between aisles, nor more than six seats between an aisle and side wall. Seats shall not be less than thirty-two inches from back to back and shall not be less than twenty inches in width measured at the top of the seat back, and shall be secured firmly to the floor.

552. Doors and Exits.) In every building of Class IVc, there shall be provided at least two entrance doors. No entrance doors shall be less than four feet in width. If the rear of the building abuts upon an alley, there shall be provided not less than two emergency exits leading directly to the said alley. Wherever emergency exits pass over or under the stage floor level, they shall be enclosed with walls of masonry nine inches in thickness, or four-inch hollow tile, or of two-inch solid plaster, composed of iron studs and metal lath and plaster, and shall have floors and ceilings of slow-burning mill, or fireproof construction. If the side of the auditorium abuts upon a street or alley, such emergency exits shall be located as follows: one exit shall be located at a distance not greater than five feet from the proscenium wall or stage, and the other exit shall be located at a distance half way between the foyer and the stage wall. Exits by means of stairways or stairway fire escapes, equal in width to eighteen inches for each one hundred persons, shall be provided, and for fractional parts of one hundred, proportionate part of eighteen inches shall be added. No such exit shall be less than two feet six inches in width.

553. Doors to Open Outward.) All doors affording ingress or egress in buildings of Class IVc shall open outward, and no door shall be less than three feet wide. Such doors shall be so constructed that they may be easily opened from within.

554. Walls Between Auditorium and Stage.) Where the area of the stage exceeds 72 square feet, there shall be provided a proscenium wall of solid masonry of not less than nine inches in thickness, extending from ground to the roof. Where the stage area is less than 72 square feet its proscenium wall may be constructed of two-inch solid plaster walls, composed of metal studs and metal lath and plaster or three-inch hollow tile. In no case shall the underside of ceiling or roof over stage house behind proscenium wall be at a higher level than three feet over the highest point of main proscenium opening. And there shall be no trap doors or other openings in the stage floor.

555. Curtain.) (a) The main curtain in the opening of the proscenium wall shall be composed of long fibre asbestos twisted on brass wire and woven into a close cloth. The laps shall be sewed with two lines of brass and asbestos stitching, which laps shall not be less than one-inch wide. Said cloth shall be lapped at least four times around the top and around the bottom bars with at least three lines of the stitching above specified.

(b) The edge of the curtain shall be continuously reinforced by lapping and stitching and also with pieces of sheet metal for clips. The curtain shall be at least thirty inches wider and higher than the masonry opening, and shall have steel top and bottom bars of not less than two square inches in cross section which bars shall be connected by four three-sixteenth-inch steel cables.

(c) There shall be three-eighth-inch spanning cables with upper ends secured to steel brackets fastened to the wall and the lower ends sufficiently counter-weighted to keep the cables taut and where cables pass through the stage floor, the holes shall be metal bushed.

(d) The curtain shall have hard wood eyelets not over eighteen inches center to center, around the standing cables on both vertical edges, which eyelets shall be secured to the curtain by bent brass clips riveted to the curtain with double sheet metal reinforcing

(e) There shall be steel lifting cables, one-half inch in diameter, at each end of the curtain and at intermediate points not over ten feet apart attached to drums on shafts located above the curtain.

(f) The operating machinery shall be built according to good mechanical engineering practice.

(g) There shall be emergency chains midway between the lifting cables, to hold the curtain which shall be equal in strength and efficiency to the lifting cables.

(h) There shall be steel guides of not less than three-eighth-inch metal on each side of the curtain from the stage floor to the level of the overhead sheaves. The metal guides shall lap the edges of the curtain not less than four inches. The curtain shall be incombustible in all its parts and its operating devices.

(i) The painting and the manner of tripping the curtain and the number of and the location of places for tripping shall be subject to the approval of the Chief Fire Prevention Engineer.

(j) A permit shall be obtained from the Department of Buildings for the erection of each such curtain. The Commissioner of Buildings shall inspect each such curtain semi-annually for which semi-annual inspection, a fee of \$5.00 shall be charged.

556. Other Openings in Stage Walls.) Every other opening in the proscenium wall or in the other walls of the stage shall have self-closing incombustible doors.

557. Structure Over Ceiling—Construction.) A structure may be built over the ceiling or roof of any building used wholly or in part for the purposes of Class IVC, provided such space is not used for sleeping or living purposes. Girders or trusses supporting same shall be of steel protected by fireproofing as required in Section 839 and the entire ceiling shall be covered with incombustible material subject to the approval of the Commissioner of Buildings.

558. Picture Machine Booth.) The walls floor and ceiling of every moving picture booth or machine house shall be built of four-inch hollow tile or four-inch solid concrete, supported on iron beams or columns, the door of operating room to be metal clad and swing outwards. There shall be a metal smoke or flue pipe eighteen inches in diameter extending from ceiling to three feet above roof of machine house and terminating in the open air outside of building.

559. Standpipes and Hose on Stage.) Where the stage area exceeds seventy-two square feet and any scenery is used on stage, there shall be a standpipe system installed on said stage subject to the approval of the Chief Fire Prevention Engineer.

560. Vent or Flue Pipe Over Stage.) (a) When the stage exceeds seventy-two square feet in area and combustible scenery is used, one or more flue pipes of incombustible material and equivalent to one-twentieth of the area of the stage shall be built over the stage and shall extend eight feet above the highest point of roof.

(b) All such flues or vents shall be provided with metal dampers which shall be controlled or operated by a small tarred hempen cord and also by two electric switches, one at the electrician's station on the stage, which station shall be fireproof, and the other at the stage fireman's station on the opposite side of the stage; the arrangement of said cord and said electric switches shall be such that the cord will operate as a fusible link between the electric control and the damper and will release said damper, should the switches or either of them, fail to operate. Such stations shall be located in such places on the stage as may be determined

by the Fire Commissioner, subject to the provisions of this paragraph, and each switch shall have a sign with plain directions as to the operation of the same printed thereon.

561. Capacity—Certification for License.) The Commissioner of Buildings shall determine the number of persons any room used for the purposes of Class IVC may accommodate according to the provisions of this chapter, and shall certify the same to the City Clerk.

562. Lighting Service Requirement.) Gas or electricity or both may be used for illuminating purposes in buildings of Class IVC but gas shall not be used in that part of the building known as the stage side of the proscenium wall. Provisions shall be made to properly light every portion of a building of Class IVC and every outlet therefrom leading to the outside of the building, and all open courts, passageways, and emergency exits. Lights in vestibules, halls, corridors, passageways, stairways and other means of egress from the building and premises shall be on an independent system or circuit or service, and shall be controlled separately and exclusively by a switch or a shutoff located near the main entrance. In rooms, halls or auditoriums used for the purposes of Class IVC provisions shall be made to furnish a light supplied by gas, above if possible, otherwise closely adjoining every opening to an exit or to an emergency exit from the room, hall or auditorium. Where the capacity of the room, hall or auditorium is greater than three hundred, provisions shall be made to furnish a light supplied by electricity and on the same circuit as the corridor and vestibule lights, above if possible, otherwise closely adjoining every opening to an exit or an emergency exit from such hall or auditorium, in addition to the gas light in such location previously required.

563. Lighting in Theaters—Test of Sufficient Light—Penalty.) Every portion of a moving picture theater, including exits, courts and corridors, devoted to the use or accommodation of the public shall be so lighted by electric light during all exhibitions and until the entire audience has left the premises that a person with normal eyesight shall be able to read Snellen standard test type 40 at a distance of twenty feet; and type 30 at a distance of ten feet; normal eyesight meaning ability to read 20 at a distance of twenty feet in daylight. Cards showing types 20, 30, and 40 should be displayed in the corridor of every such theater together with a copy of this ordinance. Any person, firm or corporation that violates, neglects or refuses to comply with, or resists or opposes the enforcement of this section, shall be fined not less than twenty-five dollars nor more than two hundred dollars for each offense, and shall be deemed guilty of a separate offense for every day on which such violations, neglect or refusal shall continue.

564. Scenery Shall Be Stationary—Approval—Metal and Asbestos Scenery.) All scenery on the stage shall be made stationary, and shall consist of not over two asbestos curtains, three stationary wings on each side and four stationary border drops. All scenery and stage paraphernalia shall be treated with a fire-retarding solution subject to the test and approval of the Chief Fire Prevention Engineer. Where all scenery is made of metal upon metal supports, metal frames, and metal attachments or where all scenery is of pure long fibre asbestos twisted on brass wire and woven into a close cloth with metal framings, metal supports and metal attachments, it shall not be considered as scenery within the meaning of the term as used in this chapter.

565. Dressing Room Partitions.) Parti-

tions forming dressing rooms, except where already built, shall be constructed of incombustible material, and such dressing rooms shall be properly ventilated as in the judgment of the Commissioner of Health may be required.

566. Frontage Consents Required.) No building of this class shall hereafter be constructed for, or converted to the use of said class, unless frontage consents are secured as required by the ordinances of the City of Chicago and filed with the Commissioner of Buildings.

CLASS IVd

567. Class IVd Defined.) In Class IVd shall be included every grand stand and every baseball, athletic and amusement park.

568. Loads—Allowance for Live Loads.) The floors and stairs of grand stands and bleacher stands, existing or hereafter built, shall be designed and constructed in such manner as to be capable of bearing in all their parts and supports, in addition to the weight of the floor construction, partitions and permanent fixtures, that may be set upon the same, a live load of not less than one hundred pounds for every square foot of surface of said floors, and a live load of not less than one hundred and fifty pounds for every square foot of the bearing surface of the stairs.

569. Grandstands—Frame within Fire Limits—Grandstands Hereafter Constructed — Fireproof — Frontage — Consents.) (a) Wooden grandstands or tiers of seats commonly known and described as grandstands now constructed or in the process of construction may be erected, repaired or enlarged within the fire limits where no part of any such structure shall be within sixty feet of any other building or structure. All grandstands hereafter erected within the fire limits, except as hereinafter provided, shall be made of fireproof or unprotected steel construction. The enclosing walls, if enclosed, shall be made of fireproof or incombustible materials, but the seats may be made of wood. Grandstands outside the fire limits, or inside the fire limits where the seating capacity does not exceed five thousand persons, may be constructed of wood, but no part of any such structure shall be within less than sixty feet of any other building or structure. The braces, supports and the underside of all seats, including bleacher seats, shall be treated with a fire-retarding solution once a year before opening up the premises containing such stand to the public.

(b) Every person, firm or corporation desiring a permit for the construction of a grandstand, except in connection with such as are now in existence, shall first obtain the consent in writing of the owners of a majority of the frontage on both sides of the street or streets on each side of the block or square in which it is desired to erect such grandstand.

(c) The Commissioner of Buildings shall inspect or cause to be inspected all tiers of seats and grandstands each year before same are opened to the public for the purpose of ascertaining whether they comply with the City ordinances and the rules and regulations of the Department of Buildings. A fee shall be charged for such annual inspection as follows:

Where the seating capacity is 5,000 or less the fee shall be \$10.00.

Where the seating capacity is more than 5,000 the fee shall be \$25.00.

570. Width of Aisles and Exits—Number of Seats Between Aisles and Width and Spacing of Seats.) (a) The width of aisles and exits in all grandstands contemplated in Section 567, hereafter constructed, shall

in no case be less than thirty-six inches, and such width shall be increased toward the exits which serve as regular entrances, such width being computed at the rate of eighteen inches per each one hundred seats, or fractional part thereof, in non-fireproof grandstands, and at the rate of twelve inches for each one hundred seats, or fractional part thereof, in fireproof grandstands.

In every grandstand or stadium hereafter erected of fireproof or of unprotected steel construction, having not less than 40,000 seats, and in which the seats are built without backs, the width of aisles shall in no case be less than 36 inches and such width shall be increased toward the exits and shall be computed, at the wider end, at a rate of not less than 10 inches in width for each 100 seats and for fractional parts of 100 seats a proportionate part of such rate of width shall be added. In such grandstand or stadium the width of stairways and their connecting passageways shall be computed at a rate of not less than 12 inches for each 100 seats and for fractional parts of 100 seats a proportionate part of such rate of width shall be added; provided that where inclined walks having no vertical risers throughout their entire length and having a maximum gradient of 15 feet rise in each 100 feet of horizontal run are used in lieu of stairs, the width of such inclined walks and their connecting passageways shall be computed at a rate of not less than 8 inches for each 100 seats and for fractional parts of 100 seats a proportionate part of such rate of width shall be added. All doorways affording ingress to and egress from such grandstand or stadium to or from the open space, streets or other thoroughfares surrounding such grandstand or stadium shall be computed at a rate of not less than 12 inches in width for each 100 seats and for fractional parts of 100 seats a proportionate part of such rate of width shall be added.

(b) The number of seats between aisles in any row shall not exceed twenty in non-fireproof grandstands, nor thirty in fireproof grandstands. Where seats are built without backs, the rows shall be spaced at least 25 inches from back to back of seat boards, and in computing the seating capacity each 18 inches in length of seat boards shall be counted as one seat.

571. Temporary Seating Structures.) Temporary seating structures for shows and outdoor exhibitions and the observation of holidays and special occasions may be built of combustible material, providing they are built structurally strong enough to support a live load of one hundred pounds per square foot, and comply with the provisions of Class IVb in regard to means of exit, aisles and rows of seats; and provided, further, that a permit be secured from the Commissioner of Buildings, which shall in no case be issued by him until the party desiring to erect said temporary seating structure shall secure the written consent of a majority of the property owners or their duly authorized agents, on both sides of the street on which said temporary seating structure is to be located in the block between the two nearest intersecting streets. Any permit issued for any such temporary seating structure as hereinabove provided for in this section shall not entitle the person so receiving said permit to use said temporary seating structure for more than ten consecutive days from the first day on which it is so used; and any temporary seating structure provided for in this section shall be removed within ten days after the use of the same as provided for in this section, and if not so removed it shall be the duty of the Commissioner of Buildings to order the same to be removed or torn down by the Fire Commissioner at the expense of the owner thereof.

572. Use of Roofs—Requirements.) Wherever the roof of any building is used for any purposes whatever, except as a covering for the building, it shall be considered as a story of the building and subject to such restrictions of use and such requirements of construction as are provided for the building by the ordinances of the City of Chicago.

Amusement Parks.

573. Frontage Consents Required.) It shall hereafter be unlawful for any person, firm or corporation, to build, construct, establish, produce or carry on, any amusement within any ground, garden or enclosure of the kind commonly known and described as amusement parks, wherein shows of different classes are offered or presented by one or more concessionaries, without first securing written frontage consents as required by the ordinances of the City of Chicago. Such frontage consents shall be filed with the Commissioner of Buildings before a permit shall be issued for the construction of any building or structure connected in any way with such amusement or amusement park.

574. Requirements.) (a) Buildings erected after March 13, 1911 within an amusement park, located outside the fire limits, shall comply, except as herein otherwise specified, with the provisions of Class IVb.

(b) Buildings erected after March 13, 1911 within amusement parks located outside of the fire limits and not exceeding one story in height and which do not contain more than one balcony may be built with a self-supporting steel frame designed as required by this chapter. Such structures may be enclosed with metal lath covered with cement plaster, which plaster shall be not less than one and one-third inches thick, or such structures may be enclosed with galvanized iron. The roofs of such structures may be of ordinary construction supported on steel trusses and covered with a gravel or composition roof, approved by the Commissioner of Buildings.

(c) Every moving picture theatre hereafter built within an amusement park shall comply with the provisions of Class IVc.

575. Open Space Between Buildings.) There shall be an open and unobstructed space of not less than four feet between each and every frame building erected after March 13, 1911, in an amusement park, where the buildings do not exceed twenty feet in height, and of not less than six feet where the buildings are over twenty feet and less than thirty feet in height, and of not less than ten feet when the buildings are over thirty feet in height. Where brick or concrete or other fireproof walls of full seventeen inches in thickness are used between such buildings and where such buildings are built of slow-burning construction, these spaces shall not be required, but, in such cases, there shall be a space of ten feet in width at intervals of every two hundred feet.

576. Roller Coaster Devices.) No roller coaster, scenic railway, or other riding, sliding, or rolling device, shall be hereafter erected of a greater height from the ground than 55 feet. All such coasters, railways, riding or other devices shall be equipped with safety clutches. The cars, or any receptacles, which persons are permitted to occupy, or in which they are permitted to travel, ascend or descend, shall have hand rails of sufficient number and height to prevent people from being thrown therefrom, and of such character as shall be approved by the Commissioner of Buildings.

577. Roller Coasters—Scenic Railways, Etc.—Permit Fee—Certificate of Test and Safety.) (a) Before any roller coaster, scenic railway, water chute or other mechan-

ical riding, sailing, sliding or swinging device is erected, either in existing or new amusement parks, a detailed plan shall be submitted to the Commissioner of Buildings, for his approval or rejection, and, if approved, a permit shall be procured by the person, firm or corporation desiring to erect such device. The permit fee shall be fifty dollars for each such device. Before such device is opened to the public each season, a certificate of inspection, signed by a competent engineer, approved by the Commissioner of Buildings, must be furnished, certifying to the practicability, strength and safety of such devices, and such device shall be examined by the Commissioner of Buildings or his employees upon completion and also each year before the opening up to the public.

(b) The Commissioner of Buildings shall inspect or cause to be inspected all buildings to be used for purposes of exhibition, amusement or entertainment which are attended by the public that are within or connected with an amusement park, each year before said buildings are open to the public, for the purpose of ascertaining whether they comply with the City ordinances and the rules and regulations of the Department of Buildings. The fee for such annual inspection shall be five dollars for each building so inspected.

(c) The Commissioner of Buildings shall inspect or cause to be inspected all amusement devices, mechanisms and structures other than riding devices and other than buildings within an amusement park, for the purpose of ascertaining whether they comply with the City ordinances and the rules and regulations of the Department of Buildings; and the fee for such annual inspection shall be ten dollars for each device, mechanism and structure so inspected.

(d) The Commissioner of Buildings shall inspect or cause to be inspected all amusement devices operated by animals or by other motor power and all other riding, sliding, sailing, swinging or rolling devices situated on any lot or tract of land outside of the amusement park before said devices are open to the public. Where said devices are taken down, removed and reassembled or re-erected in another location, the Commissioner of Buildings shall inspect or cause said devices to be reinspected after each removal and before said devices are open to the public, for the purpose of ascertaining whether they comply with the City ordinances and the rules and regulations of the Department of Buildings. A fee of five dollars shall be made for every such inspection or re-inspection.

578. Must Comply With All Ordinances.) It shall be unlawful for any person, firm or corporation to construct, alter or operate any amusement park or any building or structure therein unless they comply with the ordinances of the city relative thereto.

578-A. Class IV-e Defined.) In Class IV-e shall be included every building hereafter erected having an arena, amphitheater or enclosed stadium for the purpose of exposition and exhibition where the seating capacity of such building shall exceed 40,000 persons. Where any building for this purpose has a seating capacity of less than 40,000 it shall be built to conform with the provisions of Class IV-b.

Frontage—Seating More Than 40,000.) Every building of Class IV-e containing an arena, amphitheater or enclosed stadium of an aggregate seating capacity of 40,000 or more shall have a frontage upon four open spaces three of which shall be public streets, while the other, if not a street, shall be a public or private alley, of a width of not less than ten feet, each end opening directly on a public street; provided that a fireproof passageway at grade level not less than seven feet in width may be used in place of one such alley, if such passageway connects with a public street at both ends.

Auxiliary Building—Heights and Construction of Communicating Doors.) (a) Every building hereafter erected and connected with or made part of any building used in whole or in part for the purposes of Class IV-e, shall, if sixty or less feet in height, be of fireproof, mill or slowburning construction, except as otherwise provided in this chapter, and, if more than sixty feet in height, of fireproof or incombustible construction, as herein provided.

(b) No existing building, other than of fireproof construction, shall be connected to any building of Class IV-e now existing or hereafter constructed, unless there is, between such building, a fire wall constructed as required by Section 732 of this Chapter and extending from the ground to and through the roof.

(c) In all such cases where both buildings are not of fireproof construction, each opening in the intervening walls shall be equipped with automatic double fire-doors as required by Section 789 of this Chapter.

Existing Building—Used for Class IV-e and for Other Purposes.) Shall comply with Par. 518, Class IV-b, of this Chapter.

Construction. Every building used for the purpose of Class IV-e, hereafter erected, containing a hall or room, arena, amphitheatre or enclosed stadium, having an aggregate seating capacity of 40,000 or more shall be built of fire-proof construction, except as hereinafter provided.

The roof may be covered with a non-corrosive sheet steel deck and an insulating material may be used provided the roof is covered with an incombustible roofing material. The soffits of all rooms, tunnels, balconies and galleries and the underside of roof trusses shall be protected with metal lath and plaster. The ceiling may be treated with acoustic materials provided they are fastened to a metal lath and plastered ceiling as above specified. The underside of metal framing for all balconies and galleries shall be protected with a suspended ceiling of metal lath and plaster. The roof trusses shall be fireproofed, however, if the lowest member of the truss is 20'-0" or more above the highest tier of seats then a suspended ceiling of metal lath and plaster will be permitted; provided that building used mainly for exposition and exhibition purposes, and not used for theatrical purposes, and which comply with this ordinance as to stairways, exits and fire escapes, may have their temporary seats, boxes, show cases, platforms, or booths, constructed of combustible material; provided, however, that any draperies, bunting or other decorations shall be treated with a fire retarding solution and shall be treated and installed subject to the approval of the Chief Fire Prevention Engineer.

Buildings in Which Seats Are Not Fixed—Seating Capacity.) Seating capacity shall be estimated as provided in Par. 520, Class IV-b, of this Chapter.

Limitations of Floor Levels—Height Above Sidewalks—Skating Rinks.) Every building used for the purpose of Class IV-e, including a skating or hockey rink, shall be constructed, operated and maintained with its main floor level not more than one foot above the inside sidewalk grade of the street upon which such building containing same fronts.

Allowance for Loads in Construction of Floors.) Shall comply with Par. 522, Class IV-b, of this Chapter.

Stairways—Entrances and Exits, Handrails, Width of.) The width of stairways in building used wholly or in part for the purpose of Class IV-e, shall be 9" for every 100 seats of the aggregate seating capacity of all rooms used for the purpose of Class IV-e in such buildings; but no stairway shall be less than four feet wide in the clear. Every hall or room used for the purpose of Class IV-e, in the building hereafter

erected shall have access to not less than eight stairways.

Balconies and galleries shall have a continuous aisle, corridor or connecting passageway completely surrounding the arena, without obstructions directly connected to stairways and fire escapes. All aisles, corridors or connecting passageways shall be 8" in width for every 100 seats. The width of corridors and connecting passageways, shall not be less than 48" and such width shall be increased towards the exits, and shall be computed at the wider ends at a rate of not less than 8" in width for every 100 seats.

Every stairway shall have handrails on each side thereof; stairways which are over seven feet wide shall have double intermediate handrails with end newel posts at least five and a half feet high; no stairway shall ascend a greater level than 13 feet 6 inches without a level landing, which landing shall be not less than four feet wide measured in the direction of the run of the stairs.

Balconies and Galleries—Designation of.) Shall comply with Par. 524, Class IV-b, of this Chapter.

Shall comply with Par. 525, Class IV-b, of this Chapter.

Aisles—Steps in Aisles—Passageways—Cross Aisles Leading to Emergency Exits.)

(a) Aisles in rooms used for the purpose of Class IV-e shall have in the aggregate a width of 8" for each 100 of the seating capacity of such room, and for fractional part of 100 a proportionate part of 8" shall be added; but no aisle shall be less than 2'-6" in width.

(b) Steps shall be permitted in aisles only as extending from bank to bank of seats and whenever the rise from bank to bank of seats is less than five inches the floor of the aisles shall be made on inclined plan, and where steps occur in outside aisles or corridors, they shall not be isolated, but shall be grouped together, and there shall be a light so placed as to illuminate such steps in such outside aisles or corridors.

Corridors, Passageways, Hallways and Doors—Width of.) Shall comply with Par. 527, Class IV-b, of this Chapter.

Seats—Number in Rows.) There shall be not more than thirty seats in any one row between aisles and in a room or rooms used for the purposes of Class IV-e of the seating capacity greater than 40,000 persons, there shall be an aisle on each side of any bank of seats, where there are over fifteen seats in a row. Rows of seats shall not be less than thirty-two inches from back to back and no bank of seats shall have a greater rise than 24"; provided that all banks of seats having a greater rise than 20" shall have a 1½" diameter iron railing at least 2'-6" high, supported by a vertical member at least every 8'0" thoroughly anchored to the structural members below.

Emergency Exits.) (a) Emergency exits and stairways shall be provided outside of any and all rooms used for the purpose of Class IV-e which have a seating capacity greater than 40,000, and such emergency exits shall have a width equal to one-half of the width of the main exits, and such emergency exits shall lead directly to a public thoroughfare.

(b) Every stairway fire escape emergency exit shall be located and constructed in accordance with the requirements of Sections 881, 882 and 885, but in no case shall any room used for the purpose of Class IV-e located above the third story of any building have less than one stairway escape emergency exit.

Doors to Open Outward.) Shall comply with Par. 530, Class IV-b, of this Chapter.

Capacity—Certification for License.) Shall comply with Par. 537, Class IV-b, of this Chapter.

Lighting Service Requirements.) Shall comply with Par. 542, Class IV-b, of this Chapter.

ARTICLE VIII.

Class V.

579. Class V Defined.) In Class V shall be included every building which is used as a public theater where an admission fee is charged and in which movable scenery is used, and every assembly hall hereafter erected having a seating capacity of over 300 and containing a permanent stage on which scenery and theatrical apparatus are used and regular theatrical vaudeville performances are given, and every theater, assembly hall, building or place with a seating capacity of more than 1,000 persons used for the exhibition of moving pictures; provided, however, that public halls and club halls with a seating capacity of less than six hundred, although occasionally used for theatrical presentation, shall not be considered as public theatres within the meaning of the term as used in this section, notwithstanding the fact that movable scenery is used upon the stages thereof on such occasions, and such public halls and club halls shall not be considered as buildings of Class V as herein defined. Such public halls and club halls shall be included in Class IV as defined in this chapter.

Whenever words are used in the articles of this chapter which relate to the classification of Class V buildings into buildings in existence and buildings hereafter erected, such words (unless expressly shown to be intended otherwise) shall be understood as referring to the date July 18, 1905, at which time the original ordinance making such classification was passed by the city council.

580. Must Comply with General and Special Provisions.) In addition to the provisions of this article every building of Class V shall also comply with the general provisions of this chapter.

581. City Officers Empowered to Enter Buildings.) The Commissioner of Buildings, Commissioner of Health, Fire Commissioner, Chief Fire Prevention Engineer, Commissioner of Gas and Electricity, Superintendent of Police, or any of them, and their respective assistants, shall have the right to enter any building used wholly or in part for the purposes of Class V, and any and all parts thereof, at any reasonable time and at any time when occupied by the public, in order to examine such buildings, to judge of the condition of the same and to discharge their respective duties, and it shall be unlawful for any person to interfere with them, or any of them, in the performance of their duties.

582. City Officers Empowered to Close.) The Commissioner of Buildings, Commissioner of Health, Fire Commissioner, Chief Fire Prevention Engineer, Commissioner of Gas and Electricity, Superintendent of Police, or any one of them, shall have the power, and it shall be their joint and several duty, to order any building used wholly or in part for the purposes of Class V, closed, where it is discovered that there is any violation of any of the provisions of the chapter, and keep same closed until such provisions are complied with.

583. License—Mayor Shall Revoke.) Upon a report to the Mayor by the Commissioner of Buildings, Commissioner of Health, Fire Commissioner, Chief Fire Prevention Engineer, Commissioner of Gas and Electricity, or the Superintendent of Police that any requirement of this chapter or that any order given by them or any of them in regard thereto has been violated, or not complied with, the Mayor shall revoke the license of any such theatre or place of amusement so reported and cause the same to be closed.

Buildings of Class V Now in Existence.

584. Buildings of Class V Now in Existence.) The following provisions shall apply

to Class V buildings in existence at the time of the passage of this ordinance:

585. Walls—Outside—Must Comply with Requirements of Section 732.) The outside walls of all such buildings in existence at the time of the passage of this ordinance, the roofs or ceilings of which are carried on trusses or girders of a span of fifty feet or more shall comply with the requirements of Section 732.

586. Columns in Walls—Alterations.) If iron or steel columns are introduced in the walls referred to in Section 585 the brick work around the same shall be bonded into that of the connecting walls, and each of such columns shall be fireproofed as provided in Sections 838 and 839 of this chapter. All alterations in such existing buildings, to make them comply with the requirements of this chapter may be executed with the same kind of materials as those originally used in the construction of such buildings; provided, that after the said building is brought into compliance with the provisions of this chapter, then all subsequent alterations, enlargements, repairs, replaced or strengthened structural parts damaged by fire, wear and tear, or otherwise, shall be made of fireproof construction or iron or steel construction covered with fireproof materials, as provided by this chapter.

587. Other Classes Built in Conjunction with Class V—Doors for Openings Between Connecting Buildings.) In all cases where existing buildings used wholly or in part for the purposes of Class V are built in conjunction with or as part of buildings devoted to the uses of other classes and where such buildings of the other classes, as specified in this ordinance, are not built entirely of fireproof construction, double iron doors shall be placed at each connecting opening between such buildings of Class V and the building connected therewith.

588. Floor Levels—Limitations of.) (a) Any audience room used for the purposes of Class V now in existence containing in the aggregate not more than five hundred seats, if in a fireproof building, may be maintained in any story thereof, but in such case there shall be at least two stairways to the ground, from the floor or floors on which each such room is located, each of which stairways shall be not less than four feet in width in the clear.

(b) In existing buildings of fireproof construction, having an audience room with a seating capacity of more than five hundred and less than fifteen hundred, the lowest bank of seats of the main floor thereof shall be not more than twelve feet above the street level, and every such building shall in all other respects conform to the requirements of this ordinance. The main floor of any existing theatre of any kind of construction shall not be raised above its present elevation.

589. Loads—Allowance for Live Loads in Construction of Floors of Class V.) For all buildings of Class V all floors shall be designed and constructed in such manner as to be capable of supporting in all their parts, in addition to the weight of floor construction, partitions and permanent fixtures and mechanisms that may be set upon the same, a live load of one hundred pounds for every square foot of surface in such floors.

590. Stairways—Handrails—Entrances and Exits.) (a) Stairways, affording egress from any room or rooms used for the purposes of Class V shall be equivalent in width to twenty inches for every one hundred of seating capacity of such room, and for fractional parts of one hundred a proportionate part of twenty inches shall be added, but no such stairway shall be less than four

feet wide in the clear, except as hereinafter provided in this section.

(b) All such stairways shall have hand railings on each side thereof and shall not ascend to a greater height than thirteen feet six inches without a level landing, and the length and width of such landing shall not be less than the width of the stairs. No run of stairs shall consist of less than six risers between platforms, and risers shall not be placed on return platforms. Stairways which are over 7 feet wide shall have double intermediate handrails with end newel posts at least 5½ feet high.

(c) Steps shall not have a greater rise than 8 inches, treads shall not be narrower than 10 inches, and winders shall not be used on any staircase, except where circular staircases are expressly permitted.

(d) In existing theatres every balcony and gallery shall have separate and distinct entrance stairways from the sidewalk level, except that in cases where the vestibule or entrance to any such theatre is not more than fifteen inches, or two steps, above the sidewalk level and such steps are at or near the building line, the stairways to such balcony and gallery may ascend from the floor of such vestibule or entrance, but if the run of the stairs at the bottom is not toward the street, there shall be a hand rail or rails, three feet above the floor constructed from the foot of such stairways for a distance of not less than five feet leading toward the street. All doors intervening between such stairways and the street shall, during each and every performance, be kept unfastened.

(e) There shall be an iron stairway or stairways from the stage to the fly galleries and gridiron, continuing to the roof of the building or to some fireproof passageway or exit. Such stairways may be circular. Such circular stairways, however, shall not be used for access to the dressing rooms.

(f) Every stairway leading to a box or boxes shall be independent of all other stairs or seats: and such stairway shall not be less than two feet eight inches wide in the clear, when such box or boxes seat not to exceed thirty people, and an additional width of one inch shall be added to such stairway for each additional five persons for whom seating capacity is provided.

(g) Every stairway on the stage side of the proscenium wall shall be not less than two feet six inches wide.

(h) Instead of increasing the width required for entrances, aisles, exits and stairways to that required by this chapter, the owner, lessee or manager of any such theatre shall have the privilege of reducing the number of permanent seats therein until the same ratio between such width and number of seats as hereinbefore provided for shall be established, and if such privilege be taken advantage of, it shall be the duty of the Commissioner of Buildings to make inspection and certify that such ratio actually exists before a license for the operation of any such theatre shall be issued.

591. Floors and Exits.) Floors at all exits shall be level and flush with adjacent inside floors and shall extend for an unbroken width of not less than four feet in front of each exit, and shall be two feet wider than such exit.

592. Seats in Rows Between Aisles.)

(a) Not more than ten seats in any row shall be permitted between aisles in any gallery. On the main floor and balcony not more than eleven seats shall be permitted between aisles; except in rows of seats which are within twenty feet from the exits, in which case thirteen seats shall be permitted between aisles.

(b) Seats shall be not less than twenty inches in width measured at the top of the

seat backs. Rows of seats shall be not less than two feet eight inches from back to back.

No bank of seats shall be of greater rise than twenty-two inches.

(c) All groups of seats shall be so arranged that there shall be an aisle at each side of each group, except that groups of five seats or less may abut upon a tunnel at one side and an aisle at the other. And except that a bank of seats abutting boxes or walls on main floor, balcony, and gallery, of not over five seats in a row, shall be required to abut upon one aisle only.

(d) The number of banks of seats on the main floor shall not exceed fifteen unless an intervening or cross aisle is provided between each fifteen banks of seats or unless a direct exit is provided for each aisle.

(e) The number of banks of seats in the balcony shall not exceed nine unless an intervening or cross aisle is provided between each nine banks of seats or unless a direct exit is provided for each aisle.

593. Limits of Vertical Rise and Requirement for Tunnels in Cross Aisles—Openings in Foyer Wall.) (a) There shall be no more than twelve feet rise measured vertically in any aisles in any floor or in any balcony or in any gallery without a direct exit by tunnel or otherwise to a corridor with free opening on to the gallery stairs or other direct discharge to the street, or at such elevation of twelve feet an intervening or cross aisle leading directly to an exit. No tunnel shall be less than three feet wide in the clear.

(b) There shall be no openings in the foyer wall between the foyer and theatre proper other than the exit openings.

594. Main Floor—Balcony and Gallery—Designation of.) (a) The lower floor of all theatres shall be designated the "Main Floor."

(b) Where there are balconies or galleries, the first balcony or gallery shall be designated the "Balcony," and the second and third balcony or gallery shall be designated, respectively, "Gallery" and "Second Gallery."

595. Aisles—Width of—Shall Lead Direct to Exit—Steps in Aisles.) (a) The minimum width of aisles with diverging sides in any room used for the purposes of Class V shall be two feet eight inches at the end near the stage and not less than three feet at the other end.

(b) The minimum width of aisles with parallel sides shall be three feet.

(c) Every aisle shall lead as nearly as possible directly to an exit, but in no case shall the center line of such exit be more than three feet from the center line of any such aisle leading thereto.

(d) Steps shall not be permitted in aisles except as extending from bank to bank of seats, and no riser shall be greater than 8 inches, and no tread shall be less than 10 inches, and whenever the rise from bank to bank of seats is less than five inches, the floor of the aisles shall be made as an inclined plane, and where steps are placed in outside aisles or corridors they shall not be isolated, but shall be grouped together and a light shall be maintained so that every place where there are steps in inclosing aisles or corridors shall be clearly lighted.

596. Corridors, Passageways, Hallways and Doors—Width of.) (a) The width of corridors, passageways, hallways and doors shall be computed in the same manner as that hereinbefore provided for stairways, excepting, however, that no corridor shall be anywhere less than four feet in width, and no door less than three feet wide, except as otherwise herein provided.

(b) All corridors, passageways, hallways and stairways leading from any balcony or gallery to any toilet room, retiring room, smoking room, check room or private office, shall lead directly to an outer exit of the building. Such corridors, passageways, hallways and stairways shall be at least three feet in width in every part, and shall be unobstructed in every part except by doors, not less than three feet in width in the clear, which shall swing outward and which shall not have locks or catches of any kind whatever.

597. **Doors—Entrance.** (a) The width of entrance doors to every theatre shall be computed on the basis of twenty inches in the clear to each one hundred permanent seats in the audience room and in addition thereto a proportionate part of twenty inches for the fractional part of one hundred seats shall be added.

(b) No mirror or architectural feature shall be so arranged as to give the appearance of a doorway, window, exit, hallway or corridor where none exists.

598. **Dressing Room Partitions.** Partitions forming dressing rooms, except where already built, shall be constructed of incombustible material, and such dressing rooms shall be properly ventilated as in the judgment of the Commissioner of Health may be required.

599. **Emergency Exits—Width—Emergency Stairs—Width—Emergency Exits Inside Walls of Buildings—Fire Escapes, Construction—Fire Escapes Leading to Street or Alley—Doors Open Outward.**

(a) Emergency exits and stairways shall be provided separately for each floor, balcony and gallery and shall be of the same aggregate width as that provided for the main exits, and shall not be less than three feet in width. Such emergency stairways shall be made of iron, steel, or other incombustible materials. Such emergency exits shall be kept free of obstructions of every kind, including snow and ice.

(b) Such emergency exits and stairways may be built inside the walls of the building, provided they are enclosed by a fire-proof partition not less than four inches thick separating the exits and stairways from the audience room or auditorium.

(c) If said emergency exits lead outside the building, the opening leading thereto shall have metal doors with wired glass panels. The doors shall open outward, and shall be hung from the inside corner of the jambs, and so constructed as not to project, when opened, beyond the outside face of the wall. Outside shutters will not be permitted, except when they open automatically from the interior, without resistance, and when used or open will automatically fasten, securely, flat against the wall,

so as not to obstruct the passage on the outside; all such automatic devices or attachments to said doors or shutters shall be subject to the approval of the Commissioner of Buildings and the Chief Fire Prevention Engineer.

(d) Whenever any such emergency stairway passes over an exit door, window or other opening, such stairway shall be completely inclosed for a space of five feet greater in width than such opening, by iron, steel or other incombustible material.

(e) All such emergency exits and stairways shall land at the ground level in a public thoroughfare or in some space that connects directly with a street or alley, and direct and immediate exit to such public thoroughfare shall not be obstructed by any doors, gates, bars or obstruction of any character.

(f) Every court in which there is an emergency stairway shall have direct and unobstructed access along the surface of the ground to a street, alley or yard opening into an alley, or street, without entering into or passing through or over any building unless by a fireproof passage at least four feet wide and seven feet high on the court or ground level.

(g) All doors in openings from any and all exits and stairways shall be so constructed that when opened they shall not obstruct any portion of any other doorway, opening or passageway.

(h) All doors affording ingress to or egress from any theatre shall open outward and such doors shall be so constructed and maintained as to require no special knowledge or effort to open them from the interior.

600. **Proscenium Wall—Curtain—Requirements for Other Openings in Proscenium Wall.**

(a) There shall be in every theatre a solid brick wall of the same construction and thickness as is required in outside walls between the auditorium and the stage. The main proscenium opening shall have a substantial steel curtain vertically operated and fireproofed on the stage side, which shall be raised and lowered by mechanical power and shall be in constant use as the regular curtain and act drop.

(b) No combustible material other than painted decorations shall be applied to the audience side of such curtains.

(c) Plans for such curtains shall be approved by the Commissioner of Buildings and a permit obtained previous to its erection. The Commissioner of Buildings shall inspect such curtain semi-annually, for which inspection a fee of five dollars shall be charged.

(d) All other openings in such proscenium wall shall have iron doors, frames and thresholds.

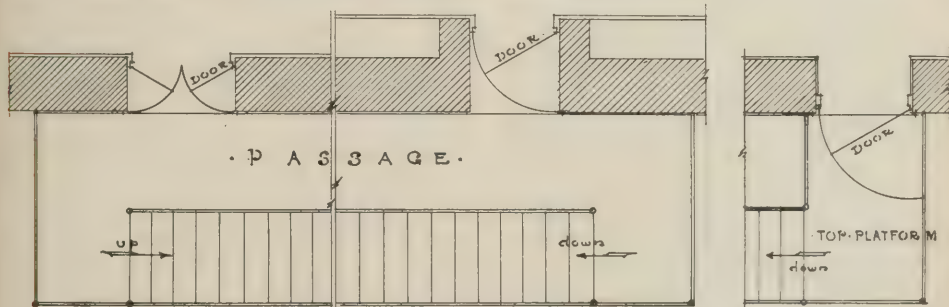


Fig. 3.
EMERGENCY EXITS.
Section 599.

Suggestion how to swing doors, so as not to obstruct passageway.

601. Stage—Construction of—Framing for Scenery.) The framing for the floor of every stage shall be of iron, steel, or reinforced concrete. The stage floor may be of wood not less than one and three-quarters inches thick, provided the underside of stage floor shall be saturated with a fireproof solution satisfactory to the Chief Fire Prevention Engineer. The entire floor construction and the floor of fly galleries, rigging lofts and paint gallery, all railings and supports and stanchions thereon, and all sheaves, pulleys and cables and their supports, shall be of iron, steel or reinforced concrete. All framing for scenery and all stage paraphernalia shall be saturated with a fireproof solution the same as prescribed for stage flooring.

602. Vestibule for Stage Doors.) All doorways and openings in the rear or sides of the stage shall be vestibuled or arranged in a manner satisfactory to the Commissioner of Buildings so as to protect the curtain, scenery and auditorium against draughts of air.

603. Vents—Flue Pipes, Size of—Dampers—Switches for Dampers.) (a) One or more vents, or flue pipes, of metal construction or other incombustible material, suitable for carrying away smoke, approved by the Commissioner of Buildings, and extending not less than fifteen feet above the highest point of the roof and equivalent in area to one-twentieth of the area of the stage, shall be built over the stage.

(b) In buildings where additional stories are built above the stage, such vents or flue pipes may be carried out near the top of the stage walls and shall be continued and run up on the exterior of the building to a point five feet above the highest point of such additional stories.

(c) All such flues or vents shall be provided with metal dampers which shall be controlled or operated by a fused cord and by two electric switches, one at the electrician's station on the stage, which station shall be fireproof, and the other at the stage fireman's station on the opposite side of the stage; the arrangement of said cord and said electric switches shall be such that the cord will operate as a fusible link between the electric control and the damper and will release said damper, should the switches or either of them fail to operate. Such stations shall be located in such places on the stage as may be determined by the Chief Fire Prevention Engineer, subject to the provisions of this paragraph, and each switch shall have a sign with plain directions as to the operation of the same printed thereon.

604. Automatic Sprinklers.) (a) A system of automatic sprinklers subject to the approval of the Chief Fire Prevention Engineer, shall be provided and installed in every theatre.

(b) Where water for such system of automatic sprinklers is supplied from a tank, the supports and installation of such tank or tanks shall be subject to the approval of the Commissioner of Buildings.

605. Lighting Requirements—Buildings Class V Now in Existence.) Lighting of every building of Class V, whether now in existence or hereafter erected, shall comply with the requirements for buildings of Class V hereafter erected.

606. Capacity—Certificate for License.) The Commissioner of Buildings shall determine the number of persons which every room used for the purpose of Class V may accommodate according to the provisions of this chapter and shall certify the same to the City Clerk. No more than the number so certified shall be allowed in such room at any one time.

607. Theatres in Frame Buildings Prohibited.) No frame building, or part thereof,

within the city, shall be used as a moving picture, vaudeville or other theatre; provided, that nothing herein contained shall be held to apply to any frame building existing at the time of the passage of this ordinance and in which a moving picture, vaudeville or other theatre is being maintained at the time of the passage of this ordinance, where all the scenery, if any, used in connection with such moving picture, vaudeville or other theatre, is constructed of either sheet-metal or asbestos, and where the amount of exit space for such theatre is at least fifty (50) inches for each one hundred (100) seats therein contained, and where there is no living apartment of any kind used, maintained or occupied as such in any part of said building.

BUILDINGS OF CLASS V HEREAFTER ERECTED.

608. Buildings of Class V Hereafter Erected.) The following provisions shall apply to buildings of class V hereafter erected and used wholly or in part for such purposes:

609. Construction—Walls—Outside Walls—Structures.) All buildings of Class V hereafter erected shall be built of fireproof construction.

610. Frontage—Open Spaces—Fireproof Passageways.) (a) All buildings hereafter erected used wholly or in part for the purposes of Class V shall be located so that they adjoin at least two public thoroughfares, one of which shall be a public street and the other may be a public alley not less than ten (10) feet in width.

(b) The audience room of every such building used for the purposes of Class V shall have either a public thoroughfare or an open space not less than ten feet wide extending from the lowest first floor level to the sky, on each of the two sides other than the proscenium and the foyer. Exit doors shall open onto such public thoroughfare or the bottom of such open space from the respective sides of the stage and of the main floor of the audience room, and onto balconies or platforms built in such public thoroughfare or open space at both the highest and the lowest floor levels of each and every balcony and gallery and the doors opening into such public thoroughfare or open space from any balcony or gallery or from the main floor shall comply with all the requirements prescribed in Section 618 of this chapter.

Provided, however, where such building has a seating capacity of not to exceed 1,000 persons, and in which the seats for the entire audience are located upon the main floor, and where no part of the main floor is higher than four (4) feet above the inside sidewalk grade of the street opposite the main entrance to such building, and where every part of every building connecting thereto or built in conjunction therewith is of fireproof construction, the provisions for open spaces alongside audience room as contained in Section 544 applicable to buildings of Class IV where the entire audience is seated on the ground level shall govern with respect to open spaces, and the provisions of Section 515 shall govern with respect to main floor aisles and direct exits from same.

Provided further that two theatres are erected simultaneously in the same building or in adjoining buildings under the same ownership, and where the aggregate seating capacity of both theater audience rooms taken together does not exceed a total of 2,500 persons, and where said building or adjoining buildings have a frontage upon three public thoroughfares, the said audience rooms may have in common an open space not less than ten feet in width in every part thereof from the line of the proscenium wall along and directly adjacent to each audience

room to the public street upon which such building or buildings face. Such open space shall be clear and unobstructed from the bottom thereof to the sky, and may be considered the equivalent of an open space for each audience room as required by this section.

(c) All such balconies or platforms as are required by this section shall be connected with stairway fire escapes leading to the street level or to the bottom of such open space and in the latter case they shall have their bottom run toward the public thoroughfare and such balconies or platforms and such fire escapes shall comply with all the requirements prescribed in Sections 881, 882 and 885 of this chapter. Every such open space, if it does not open into a public thoroughfare shall communicate with the public thoroughfare at the front side of the theatre by a fireproof passageway leading from the bottom level of such open space to the sidewalk level. Where there is a public thoroughfare behind the stage every such open space shall also communicate with such public thoroughfare by a fireproof passageway leading from the bottom level of such open space to the level of the public thoroughfare behind the stage, and passing under the stage.

(d) The walls of a fireproof passageway shall not be less than four inches thick, and each and every part of such passageway, including each and all of its supports, shall be built of fireproof construction as required in the general provisions of this chapter relating thereto.

(e) Radiators for warming passageways shall be in recesses sufficient in depth to prevent them from obstructing the passageway.

(f) There shall be no steps or risers in fireproof passageways, but where necessary, inclined floors of the full width of the fireproof passageway may be built; the incline of the floor shall not exceed two and one-half inches in height per foot measured horizontally, and no such incline shall be less than ten feet in length. No fireproof passageway shall be less than ten feet wide and eight feet high in any part thereof except at doors, and these door openings shall be not less than eight feet wide and seven feet high.

(g) If the principal entrance corridor of a theatre is at one side and approximately at right angles to the central axis of the audience room, then the center line extended of such principal entrance shall intersect the center axis of the stage and the audience room between the back of the seat most remote from the stage, on said center axis of the stage and the audience room and at a point midway between such seat and the wall opposite the proscenium wall.

611. Buildings of Other Classes Built in Conjunction with Class V.) If buildings used wholly or in part for purposes of Class V, are built in conjunction with or as part of buildings devoted to the uses of other classes, then such buildings of other classes shall be built of fireproof construction.

612. Floor Levels—Live Loads.) (a) The floor level of the highest bank of seats on the main floor shall not be more than three feet above the sidewalk level and the floor level of the lowest bank of seats on said floor shall not be more than eight feet below the sidewalk level.

(b) All floors shall be designed and constructed in such manner as to be capable of bearing in all their parts, in addition to the weight of floor construction, permanent fixtures and mechanisms that may set upon the same, a live load of one hundred pounds for every square foot of surface in such floors.

613. Stairways—Handrails—Entrances and Exits.) (a) Stairways affording ingress to or egress from any room used for the purposes of Class V shall be in width equivalent to twenty inches for each one hundred of seating capacity of such room, and for fractional parts of one hundred a proportionate part of twenty inches of width shall be added, but in no event shall any such stairways be less than four feet in the clear, except as hereinafter provided.

(b) All such stairways shall have hand rails on each side thereof, and shall not ascend to a greater height than thirteen feet six inches without a level landing, and the length and width of such landing shall be not less than the width of the stairs; no run of stairs shall consist of less than six risers between platforms, and risers shall not be placed on return platforms. Stairways which are over seven feet wide shall have double intermediate hand rails with end newel posts at least five and one-half feet high.

(c) Steps shall not have a greater rise than eight inches, treads shall not be narrower than eleven inches, and winders shall not be used on any staircase.

(d) Every balcony and gallery shall have one or more separate and distinct exits and stairways to the sidewalk level. All gallery stairways shall lead to the top gallery and there shall be doors in same at each floor for exit purposes only. The bottom run of the stairs shall be directly toward the street. Such stairs may ascend from the vestibule or entrance inside of the buildings, but the bottom riser of such stairs shall be not more than sixty-five feet from the building line. All doors between such stairs and the street shall be kept unlocked and unfastened during each and every performance and until the audience has left the building.

(e) There shall be an iron stairway or stairways from the stage to the fly gallery and gridiron, continuing to the roof of the building or to some fireproof passageway or exit. Such stairway may be circular. Such circular stairways, however, shall not be used for access to the dressing rooms.

(f) Stairs leading to a box or boxes seating not to exceed thirty people in the aggregate shall be independent of all other stairs and seats, and not less than two feet eight inches wide in the clear. For each additional twenty-five persons for whom seating capacity is provided, or major portion thereof, in such box or boxes there shall be an additional five inches in width of such stairway.

(g) All stairways on the stage side of the proscenium wall shall be not less than two feet six inches wide.

614. Floors at Exits—Seating.) (a) Floors at all exits shall be level and flush with adjacent inside floors and shall extend for an unbroken width of not less than four feet in front of each exit, and shall be two feet wider than such exit.

(b) There shall not be more than ten seats in any one row between aisles.

(c) Seats shall be not less than twenty inches in width, measured at the top of the seat backs.

(d) Rows of seats shall not be less than two feet ten inches from back to back.

(e) No bank of seats shall have a greater rise than twenty inches. A bank of seats abutting boxes or wall on main floor, balcony or gallery of not over five seats in a row, shall be required to abut upon one aisle only.

(f) Seats in loges and boxes shall be limited in the ratio of one seat for every six hundred and eighty square inches of floor area in such loge or box.

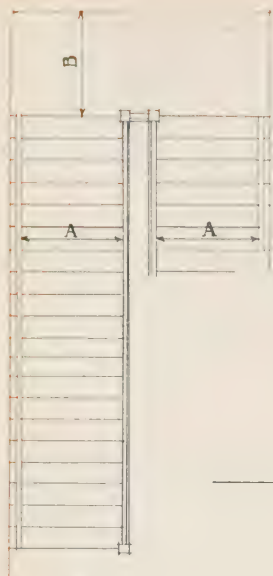


Fig. 4.

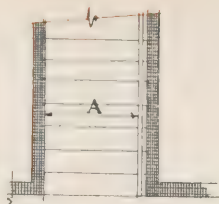


Fig. 5.

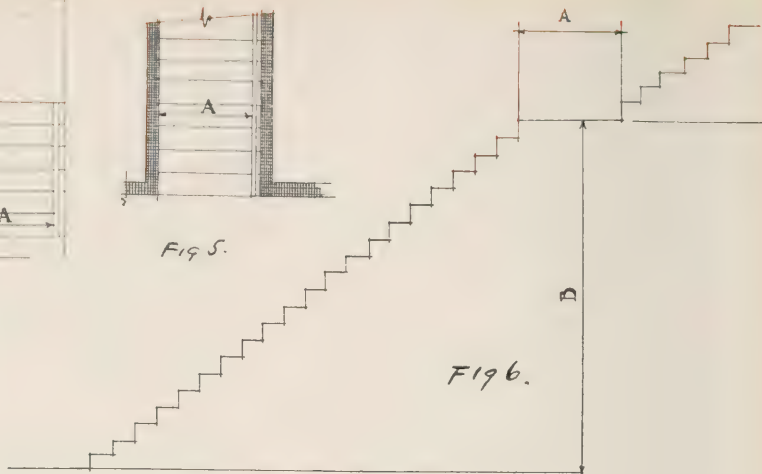


Fig. 6.

STAIRWAYS.

Sections 551, 656, 664, 667, 701, 878, 880 and others.

Fig. 4 (A) Shows measurement of stairways where hand rails are required on each side.
(B) Shows measurement of landing.

Fig. 5. Measurement of stairway where hand rail is required on one side only.

Fig. 6 (A) Landing.

(B) Stairways shall not ascend to an unlimited height (B) without a landing (A), and (A) shall not be less in width and length than (A) Fig. 4 measurement of stairs.



Fig. 7.



Fig. 8.

Fig. 7. Over 7' 0" (for exceptions see ordinance) wide stairways (C) shall have double intermediate hand rails. In plan (Fig. Sec. AA).

(B) Measurement of stairs where double intermediate hand rails occur.

(C) Measurement of stairs where double intermediate hand rails do not occur, as in general case, Fig. 4 (A).

Fig. 8. Newel post 5½' 0" high (A) required for stairs as referred to in Fig. 8.

(g) All groups of seats shall be so arranged that there shall be an aisle at each side of each group, provided groups of five seats or less may abut upon a tunnel at one side and an aisle on the other side.

(h) The number of banks of seats on the main floor shall not exceed fifteen, unless an intervening or cross aisle is provided between each fifteen banks of seats or a direct exit is provided for each aisle. The number of banks of seats in the "balcony" and "galleries" shall not exceed nine, unless an intervening or cross aisle is provided between each nine banks of seats or a direct exit is provided for each aisle.

615. **Limit of Rise in Floor—Opening in Foyer Wall.** (a) There shall be no more than eleven feet rise, measured vertically, in any main floor or in any gallery or in any balcony without a direct exit by tunnel or otherwise, to a corridor with free opening onto the gallery stairs or other direct discharge to the street or at any such elevation of eleven feet an intervening

or cross aisle leading directly to an exit. No tunnel shall be less than four feet wide in the clear.

(b) There shall be no openings in the foyer wall between the foyer and theatre proper other than the exit openings.

616. **Main Floor—Balcony and Gallery—Designation of.** (a) The lower floor of every theatre shall be designated the "Main Floor."

(b) Where there are balconies or galleries, the first balcony or gallery shall be designated the "Balcony" and the second and third balcony or gallery shall be designated, respectively, "Gallery" and "Second Gallery."

617. **Width of Aisles—Exit from Aisles—Steps in Aisles.** (a) The minimum width of aisles with divergent sides in any room used for the purpose of Class V shall be two feet eight inches at the end nearest the stage and not less than three feet at the other end. The minimum width of aisles with parallel sides shall be three feet.

(b) Every aisle shall lead directly to an exit. An exit located at the end of any aisle and at right angles thereto shall be considered a direct exit.

(c) Steps shall not be permitted in aisles except as extending from bank to bank of seats, and no riser shall be more than eight inches in height, and no tread shall be less than ten inches in width, and wherever the rise from bank to bank of seats is less than five inches, the floor of the aisle shall be made as an inclined plane, and where steps are placed in outside aisles or corridors they shall not be isolated but shall be grouped together, and a light shall be installed so that every place where there are steps in such aisles or corridors shall be clearly lighted.

618. **Corridors—Passageways—Hallways and Doors—Width of—Leading from Toilet Rooms and Cloak Rooms to Outer Exits of the Building—Width of Entrance Doors.** (a) The width of corridors, passageways,

hallways and doors shall be computed in the same manner as that hereinbefore provided for stairways, provided, however, that no corridor shall be less than five feet in width and no doorway less than three feet wide, except as otherwise herein provided.

(b) Every toilet room, retiring room, smoking room, cloak room, check room or private office which is accessible from any corridor, passageway, hallway or stairway leading from any floor, balcony or gallery shall, in addition to the entrance thereto, have an exit arranged in such manner as to permit of direct passage through such room or office, without returning, to an outer exit of the building. Corridors, passageways, hallways and stairways shall be at least four feet in width in every part between such balcony or gallery and such outer exit, and shall be unobstructed in every part, except by doors not less than three feet in width in the clear, which shall swing outward and which shall not be provided with locks or catches of any kind whatever.

(c) The width of entrance doors to every theatre shall be computed on the basis of twenty inches in the clear to each 100 permanent seats in the audience room, and in addition thereto a proportionate part of twenty inches for the fraction part of 100 seats remaining shall be added.

619. Emergency Exits and Stairs—Width of—Emergency Stairs—Construction of, Requirements—Shall Not be Obstructed—Emergency Exits Inside Walls of Buildings—Doors to Open Outward.) (a) Emergency exits and stairways shall be provided separately for each floor, balcony or gallery and shall be of the same aggregate width as that provided for the main exits, and shall be not less than three feet in width. Such emergency stairway shall be made of iron, steel or other incombustible material.

(b) Such emergency exits and stairways may be built inside the walls of the building, provided they are enclosed by a fire-proof partition not less than four inches thick, separating the exits and stairways from the audience room or auditorium.

(c) If such emergency exits lead outside the building, the openings leading thereto shall have metal doors with wired glass panels. The doors shall open outward, and shall be hung from the inside corner of the jambs, and so constructed as not to project, when opened, beyond the outside face of the wall, and outer shutters shall not be permitted.

(d) Whenever such emergency stairway passes above an exit door, window or other opening, such stairway shall be completely enclosed by iron, steel or other incombustible material for a space of five feet greater in width than such opening, and such openings below such emergency stairway shall be equipped with approved metal frames and doors or metal sash and wired glass.

(e) All such emergency exits and stairways shall land at the ground level in a public thoroughfare or in some space that connects directly with a street or alley, and direct and immediate exit to such public thoroughfare shall not be obstructed by any door, gate, bars or obstructions of any character.

(f) Every court in which there is an emergency stairway shall have direct and unobstructed access along the surface of the ground to a street, alley or yard opening into an alley or street, without entering into or passing through or over any buildings unless by a four-foot wide fire-proof passage on the court or ground level.

(g) All doors in openings from emergency exits and stairways shall be so constructed that when opened they will not obstruct any portion of any other doorway, opening or passageway.

(h) All doors affording ingress to or egress from any theatre shall open outward.

620. Proscenium Wall Curtain and Requirements — Permit for and Inspection of Curtain.) (a) There shall be a solid masonry wall of the same construction and thickness as is required in the outside walls of the building in which such theatre is located between the auditorium and the stage.

(b) The main proscenium opening shall have a vertically operated steel curtain which shall, when it is lowered, completely close such proscenium opening. The curtain shall be raised and lowered by hydraulic power, and shall be in constant use as the regular curtain and act drop.

(c) The lowering of the curtain shall be controlled from not less than two points in the building, one of which shall be from the stage level and the other shall be designated by the Commissioner of Buildings.

(d) The curtain shall have a steel covering on the outer or auditorium side. The stage side covering shall be of a non-heat-conducting substance of such a thickness and such material as shall stand a test of two thousand degrees Fahrenheit on the stage side for fifteen minutes without heating the opposite side to a higher temperature than three hundred and fifty degrees Fahrenheit.

(e) All metal work with the exception of the frame shall be covered with such non-heat-conducting substances on the stage side.

(f) The curtain shall operate vertically in steel guides of such a cross section that the edges shall engage and secure the edges of the curtain and prevent the curtain from leaving the guiding channel or channels if the curtain should tend to buckle or bag either inward or outward. No metal in the guide channel or in the engaging edge of the curtain shall be less than three-eighths of an inch thick. The joints of the curtain with the proscenium wall, with the stage floor and with the head of the opening shall be made gas tight as nearly as practicable.

(g) The calculations for the strength of the curtain, the curtain guides and the guide anchors, and the workmanship, shall be according to the best modern engineering practice. The stresses in the material and in the various sections of steel shall be within the safe limits of stress described in this ordinance.

(h) No part of a curtain or of the curtain guides shall be supported by or fastened by any combustible material.

(i) The supports of the curtain and the curtain guides and edges and the curtain shall be of sufficient strength to safely resist either inward or outward a pressure of five pounds for each and every square foot of the curtain.

(j) No combustible material other than painted decorations shall be applied to the audience side of any such curtain.

(k) Plans for every such curtain shall be approved by the Commissioner of Buildings and a permit obtained therefor previous to its erection. The Commissioner of Buildings shall inspect such curtain semi-annually, and for each such inspection a fee of five dollars shall be charged.

(l) Every other opening in such proscenium wall shall have self-closing regulation standard iron fire doors and iron frames and thresholds; such doors and frames shall be built in such a manner as to resist warping.

(m) Buildings for the exhibition of moving pictures and with a seating capacity of more than 1,000, where such buildings contain a stage of any area or a platform that exceeds 312 square feet in area, shall be constructed so as to comply in every respect with the requirements for buildings of Class V hereafter erected.

Where a stage is not desired and such buildings are equipped with a platform not exceeding 312 square feet in area, the proscenium wall and the several ordinance requirements for stages upon which scenery is used may be omitted and no scenery, curtains, drapes, properties or effects of any description whatsoever can be used on, above or about such platform. The said platform shall be built of fireproof construction and shall have three sides open. The front edge of the platform shall not at any point extend into the auditorium more than nine feet measured from the inside face of the rear wall of the building. The rear of the platform shall abut the rear wall of the building. Immediately forward of the rear wall of the building an auxiliary wall of fireproof construction may be built extending from floor to ceiling to form a recess for the rear four feet of the platform depth. The auditorium face of this wall at its junction with the side edge of the platform shall not be distant more than four feet from the inside face of the rear wall of the building. The said wall may extend perpendicular to the longitudinal axis of the platform and auditorium, or may curve inward toward the auditorium at a radius in length equal to the width of the auditorium, the curve to be described from a center point on the longitudinal axis of the auditorium, the sides and top of the recess to be returned flush with the edge of the auxiliary wall to the rear wall and no openings to penetrate the recess except doorway opening at either side to afford access to platform from a stairway. Not more than two stairways may ascend from the auditorium floor to platform and the total width of stairways shall not exceed eight feet. The floor for 10 feet in every direction about the platform shall be constructed at the same general plane or elevation as the floor on which the first row of seats are placed. Side boxes or organ lofts may be constructed extending to the rear wall of the building but shall in no case come within 10 feet of edge of platform. The ceiling of the auditorium shall extend over the platform to the back wall of building and no drop beams or other construction shall extend below the ceiling level within 10 feet of the vertical projection of the platform. The screen for the display of pictures shall be attached to the rear wall of the building and not to exceed six inches away from same. The moving picture screen drape shall be installed and maintained subject to the approval of the Chief Fire Prevention Engineer. No scaffolding, paint bridge, grill work, gridiron, rigging loft or any device or mechanism, stationary or portable, for the handling, maintaining, storing or exhibiting of any scenery, drops, curtains, wings, effects or properties shall be installed used, maintained or stored above, on or about said platform.

621. Stage—Construction of—Framing for Scenery.) The framing for the floor of every stage shall be of iron, steel or reinforced concrete. The stage floor may be of wood not less than two and three-quarters inches thick, provided the underside of stage floor shall be saturated with a fireproof solution satisfactory to the Chief of Fire Prevention and Public Safety. The entire floor construction and the floor of fly galleries, rigging lofts and paint gallery, all railings and supports and stanchions thereon, and all sheaves, pulleys and permanent cables and their supports shall be of iron, steel or reinforced concrete. All framing for scenery and all stage paraphernalia shall be saturated with a fireproof solution the same as prescribed for stage flooring.

622. Vestibules for Stage Doors.) All doorways and openings in the rear or sides of the stage shall be vestibuled or arranged in a manner satisfactory to the Commissioner of Buildings, so as to protect the

curtain, scenery and auditorium against draughts of air.

623. Structures Over Ceiling—Construction.) If any structure is built over the ceiling or roof of any theater, the different members of the girders or trusses supporting same shall be fireproofed in the manner prescribed for columns of fireproof buildings as specified in the General Provisions of this chapter.

624. Vents—Size of—Flue Pipes—Dampers—Switches for Dampers.) (a) One or more vents or flue pipes of metal construction, or other incombustible material, suitable for carrying away smoke, and approved by the Commissioner of Buildings, and extending not less than fifteen feet above the highest point of the roof, and equivalent in area to one-twentieth of the area of the stage, shall be built over the stage.

(b) In buildings where additional stories are built above the stage, such vents or flue pipes may be carried out near the top of the stage walls and shall be continued and run up on the exterior of the building to a point five feet above the highest point of such additional story.

(c) All such flues or vents shall be provided with metal dampers which shall be controlled or operated by a small tarred hempen cord and also by two electric switches, one at the electrician's station on the stage, which station shall be fireproof, and the other at the stage fireman's station on the opposite side of the stage; the arrangement of said cord and said electric switches shall be such that the cord will operate as a fusible link between the electric control and the damper and will release said damper, should the switches or either of them, fail to operate. Such stations shall be located in such places on the stage as may be determined by the Fire Commissioner, subject to the provisions of this paragraph, and each switch shall have a sign with plain directions as to the operation of the same printed thereon.

(d) All fuse boxes shall be surrounded by two thicknesses of fireproof materials, with an air space between, and no fuses shall be exposed to the air between the switchboards.

625. Standpipes—Automatic Sprinklers—Tanks for Water.) (a) A system of standpipes and of automatic sprinklers subject to the approval of the Chief Fire Prevention Engineer, shall be provided and installed in every theater.

(b) The supports and installation of all tanks used to supply water to such system of standpipes and such automatic sprinkler system shall be subject to the approval of the Commissioner of Buildings.

626. Ice Making Machinery—Prohibition of.) It shall be unlawful to install any machinery or compressors of any description to be used in conjunction with ammonia in the manufacture of artificial ice in the auditorium or stage parts of any building of Class V, and it shall be unlawful to convey ammonia or to install any piping for the conveying of ammonia into any building of Class V for the purpose of manufacturing artificial ice from any machinery or compressors situated outside of any building of Class V.

627. Lighting Service Requirements—Gas or electricity or both may be used for illuminating purposes in buildings of Class V hereafter erected. Gas shall not be used in that part of the building known as the stage side of the proscenium wall. Provisions shall be made to properly light every portion of a building of this class and every outlet therefrom leading to the outside of the building and all open courts, passageways and emergency exits. Lights in vestibules, halls, corridors, passageways, stairways and other

means of egress from the building and premises shall be on an independent circuit or service and shall be controlled separately and exclusively by a switch or shutoff located near the main entrance. In rooms, halls and auditoriums used for the purposes of this class, provisions shall be made to furnish a light supplied by gas and a light supplied by electricity above if possible, otherwise closely adjoining every opening to an exit or to an emergency exit from the room, hall or auditorium.

The light furnished by gas as required by the provisions of this section above or adjacent to an exit or exits may be omitted if in lieu thereof a light supplied by electricity furnished by storage battery system or by a motor generator and service battery system is installed. Said lights, motor generator and battery system shall be approved by the Commissioner of Gas and Electricity, and shall be installed and operated in compliance with the rules of the Department of Gas and Electricity.

Amendment of July 15, 1924.

628. Dressing Room Partitions.) Partitions forming dressing rooms shall be constructed of incombustible material, and such dressing rooms shall be properly ventilated as in the judgment of the Commissioner of Health may be required.

629. Capacity—Certificate for License.) (a) The Commissioner of Buildings shall determine the number of persons which each room used for the purpose of Class V may accommodate according to the provisions of this chapter, and shall certify the same to the City Clerk. No more than the number so certified shall be allowed in such room at any one time.

(b) Before a license shall be issued for the operation of a building of Class V as a theater the Commissioner of Buildings shall first certify, in writing, that such theatre complies with the provisions of this chapter in every respect.

630. Scenery—Definition—Movable Scenery.) (a) "Scenery" as used in this chapter shall include all scenery, drop curtains, borders and wings which are constructed or made of cloth, canvas or combustible material, whether stationary or movable.

(b) "Movable Scenery" shall include all scenery, drop curtains, borders, and wings which are made movable for the purpose of changing an entire set of scenery and substituting another set during or between the various stage acts.

(c) No combustible material other than painted decorations shall be applied to the walls, ceiling or curtain of an audience room in any building of Class IV or V. This prohibition, however, shall not apply to the case of an entertainment of a spectacular character given in a public theater of Class V having a seating capacity of three thousand or more where all other scenery except such scenery necessary in such spectacular performance is removed from the stage, and where it is necessary for the complete presentation of the entertainment to modify the appearance of the proscenium walls and arch, and the walls of the auditorium, on either or both sides thereof, and to extend the stage into the audience room as hereinafter specified so as to make the whole appear to be part of a church, cathedral or other place of worship, such proposed modifications to be immovable and permanent during the period of time in which the spectacle is to be presented in the said theater. In such modifications, however, the added parts must be composed either of non-combustible material, or if composed of combustible materials such material must be thoroughly treated as often as may be required with a fire-proofing solution which shall render the material non-

inflammable, satisfactory to the Chief Fire Prevention Engineer. Such modifications shall not be more than fifty-four (54) feet high, the stage part thereof shall extend not more than seventeen (17) feet in front of the proscenium wall of such theater, and the other parts thereof shall extend not more than thirty-eight (38) feet beyond either side of the proscenium arch of such theater. If any such extension of the stage is made into the audience room it shall be approached on the audience side thereof by a series of steps constructed across the greater portion of its breadth, such steps to be each not more than seven (7) inches in height and eleven (11) inches in depth. Such modifications are to be so constructed as in no way to interfere with the free action of the steel or other fireproof curtain or curtains in such public theater. All details of construction in connection with such modifications shall be subject to the approval of the Commissioner of Buildings of the City of Chicago. No such modifications, however, shall be permitted to be maintained after the conclusion of such spectacular engagement, and at the conclusion thereof such modifications shall be removed from such theater and the said theater be placed in substantially the same condition that it was prior to the installation of said modifications. During every performance or display in any such public theater, such theater shall employ and maintain in and about the close vicinity of such modifications at least one retired uniformed city fireman for each five hundred persons in the seating capacity of such theater or part thereof, said fireman to be instructed and drilled by, and be under the supervision of the Chief Fire Prevention Engineer, and said firemen shall have in such theater such portable or temporary fire extinguishing apparatus as may be designated by the Chief Fire Prevention Engineer.

631. Changing from Class IV to Class V.) Whenever an existing Class IV theatre is changed into a Class V theatre, the same shall be made to comply with all of the provisions for Class V theatres hereafter erected.

ARTICLE IX.

Class VI.

632. Class VI Defined.) In Class VI shall be included every tenement and apartment house or building or portion thereof, which is used or intended to be used as a home or residence for two or more families living in separate apartments.

633. Requirements—General.) Every building of Class VI shall comply with the general provisions of this chapter, and in addition to the general provisions shall comply with the following special provisions:

634. Definition of "Existing Tenement,"—"New Tenement"—"Apartment"—"Yard"—"Court"—"Shaft"—"Public Hall"—"Stair Hall"—"Basement"—"Cellar"—"Story"—"Solid Masonry".) (a) "New Tenement house" shall include every tenement, flat and apartment house erected after December 17, 1902, and every tenement house which shall hereafter be increased or diminished in size or otherwise altered after its erection and every building now or hereafter in existence not now used as a tenement house but hereafter converted or altered to such use. "Existing tenement house" shall be construed to mean a flat or apartment house built prior to December 17, 1902.

(b) "Apartment" is a room or suite of two or more rooms occupied or intended or designed to be occupied as a family domicile.

(c) "Yard" is an open unoccupied space on the same lot with a tenement house, separating every part of every building on the lot from the rear line of the lot.

(d) "Court" is an open, unoccupied, unobstructed space, other than a yard, on the same lot with a tenement house; a court entirely surrounded by a tenement house is an "inner court"; a court bounded on one side and both ends by a tenement house, and on the remaining side by a lot line is a "lot line court"; a court extending to a street, alley or yard is an "outer court."

(e) "Shaft" includes exterior and interior shafts, whether for air, light, elevator, dumb waiter or any other purpose; a "vent shaft" is one used solely to ventilate or

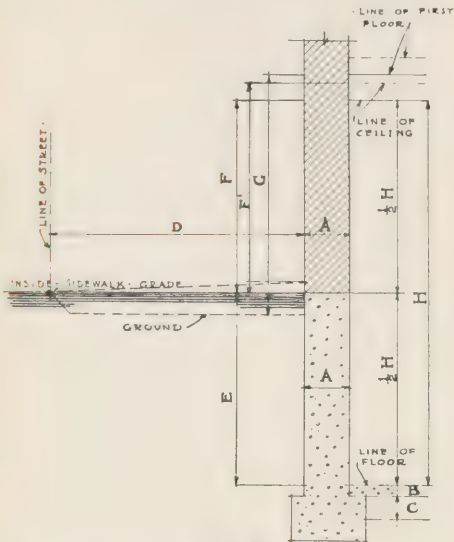


Fig. 9.

DEFINITION OF BASEMENT, ETC.
Sec. 634

- (H) Height of basement (floor to ceiling).
(D) Distance from street line nearest the building.
(E) Distance below sidewalk grade.
(F) Distance above sidewalk grade.

Explanation:

Basement is a story partly but not more than $\frac{1}{2}$ below ($\frac{1}{2}$ H) the level of the inside sidewalk grade. If floor of basement is less than 2 ft. (E) below such grade, or if ceiling of such basement is more than 7' 6" (F) above said grade, said story shall be classed as first story.

(F) For every foot of (D) F may be raised not more than 1-3", as at (F').

(G) Equals distance from ground to line of first floor.

Ex. for yard ground levels or walks or other improvements for a distance of 12' 0" at every point from all outside walls. (G) shall not be lower than 8' 3".

Sec. 639

(A) Not to be less than 12". (See Sec. 506 for exceptions).

(B) 3" thickness of floor required.

(C) 6" sand or cinders required.

light a water closet compartment, bath room, or pantry.

(f) "Public Hall" is a hall, corridor or passageway not within an apartment.

(g) "Stair Hall" includes the stairs, stair landings and those portions of the public halls through which it is necessary to pass in getting from the entrance floor to the top story.

(h) "Basement" is a story partly, but not more than one-half below the level of the inside sidewalk grade of the street nearest the building. If the floor of such basement is less than two feet (2 ft.) below such grade or if the ceiling of such basement is more

than seven feet, six inches (7 ft. 6 in.) above said grade, said story shall be classed as the first story of the building in which it occurs. Provided, however, that the ceiling height may be raised above the height of seven feet, six inches (7 ft. 6 in.) heretofore given, not more than one-third of an inch for every foot of such distance said building is set back from the street line of the street nearest the building, but in no case shall any rise of ceiling be allowed for any distance beyond thirty feet (30 ft.) said building may be set back from the line of the street nearest the building, and in such cases all rises in the basement ceiling shall be computed according to the distance between the street line and the outside wall of the building nearest to said street line. Provided further, that the yard or ground level, or walks, or other improvements thereon for a distance of twelve feet (12 ft.) at every point from all outside walls of said building shall not be lower than eight feet three inches (8 ft. 3 in.) below the floor level of the first story of said building.

(i) "Cellar" is a story more than one-half below the level of the inside sidewalk grade of the street nearest the building.

Where the grade of a street adjacent to a tenement house varies, the average grade of such street opposite the lot containing the tenement house shall be regarded as the grade of such street within the meaning of this chapter.

(j) "Story" is that portion of a building between the top of any floor beams and the top of the floor or ceiling beams next above.

635. Where Sections of This Article Conflict With Other Sections. In cases of direct conflict with the provisions of other sections of this ordinance relating to other classes, or of sections in other articles of this chapter, the provisions of the sections in this article relating to Class VI shall govern in respect to tenement houses.

636. Changes or Alterations—Permits.) Every new tenement house and every change or alteration in any existing tenement house shall conform to the requirements of this chapter. No new tenement house shall be begun, nor shall any changes or alterations in any existing tenement house, such as are referred to in this chapter, be begun until a permit therefor shall have been issued by the Commissioner of Buildings. Such permit shall be issued only upon an application by the person, firm or corporation for whom the building is to be erected or altered, and after approval of the plans and specifications for such tenement house or for such changes or alterations by the Commissioner of Health whenever such approval is required by the ordinances of the City of Chicago.

637. New Tenement House—When to be Occupied.) (a) No new tenement house shall be occupied in whole or in part for human habitation until the issuance of a certificate by the Commissioner of Health that said building conforms to the requirements of this chapter relative to light and ventilation, plumbing and drainage applicable to said buildings, nor until the issuance by the Commissioner of Buildings of a certificate that the said building conforms to the requirements of this chapter relative to fire escapes and means of egress applicable to new tenement houses. Within five days from date of application for any certificate above mentioned, such certificate shall be issued or the official concerned shall state in writing his reasons for his refusal to issue said certificate.

(b) The certificate above referred to may be issued in the case of a new tenement building comprising more than three apartments so as to allow the occupation of any section of the building extending from cellar to roof in advance of the completion of the other portions of the building.

(c) When the outer walls of a new tenement house have been erected so as to outline the position of the courts and shafts required for the lighting and ventilation of habitable rooms, the owner of the building or his representatives shall be entitled, upon application in writing, to an inspection of the same by the Commissioner of Buildings, and if the work to that point is in compli-

distant more than fifty feet from such junction shall not be regarded as part of a corner lot, but shall be subject to the provisions of this chapter respecting other than corner lots. Where, in corner lots, the two frontages are of unequal length, the lesser street frontage shall be taken as the width of the lot. Street frontage alone, and not alley frontage shall be considered in determining such lesser frontage.

640. **Height—How Measured.** (a) The height of a new tenement house shall not exceed by more than one-half the platted width of the widest street on which it abuts, and no existing tenement house shall be increased beyond such height.

(b) Provided, however, that any distance the building sets back from the lot line shall be added to the width of the street in making this computation. Such height shall be the perpendicular distance from the inside sidewalk grade of the street nearest the building to the highest point of the external bearing walls and shall not include any cornice or bulkhead less than eight feet high or any elevator enclosure less than sixteen feet high. Where such street grade varies, the mean or average grade thereof opposite such building shall be the data from which such height is measured.

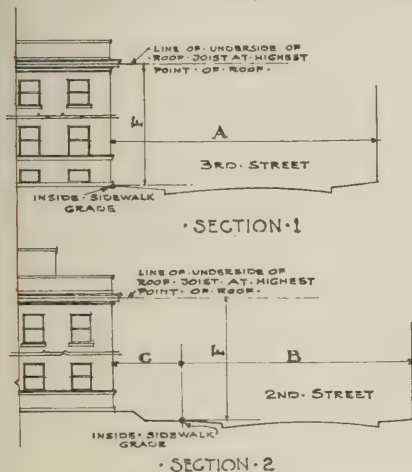


Fig. 10.

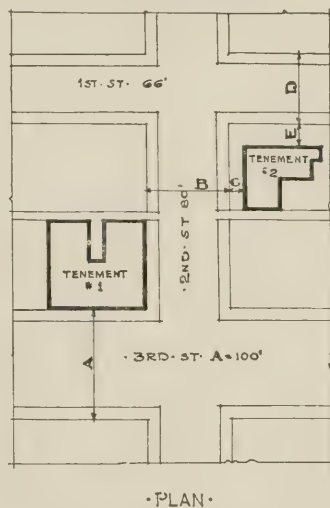
ance with the provisions regarding the size of shafts and the location of the building, to a certificate setting forth those facts.

(d) When the work of constructing partitions has advanced to a degree on any floor, that the rooms on that floor are determined in their dimensions, the owner or his representatives shall be entitled to an inspection from the Commissioner of Buildings, and if the rooms thus outlined conform in their dimensions to the plans filed and to the requirements of this chapter, he shall be entitled to a certificate stating that fact.

(e) If a new tenement house is occupied as a place of habitation in any of its parts in violation of this section, it shall forthwith be subject to notice from the Commissioner of Buildings and shall be vacated upon such notice and shall not again be occupied until made to conform with the provisions of this chapter nor until after the issuance of the two certificates required in this section.

638. **Plat to be Filed.** At the time of applying for a permit for the erection of, alteration of, addition to or moving of a tenement house or for the erection, alteration, adding to or moving of any building upon a lot upon which a tenement house stands, the applicant shall submit to the Commissioner of Buildings a plat of the lot, showing the dimensions of the same and the position to be occupied by the proposed building or by the building to be altered or added to or by the building to be moved thereon, and the position of any other building or buildings that may be on the lot. The measurements shall in all cases be taken at the top of the first story and shall not include any portion of any street or alley.

639. **Corner Lot Defined—Frontages.** By "corner lot" is meant a lot situated at the junction of two streets or of a street and a public alley at least sixteen feet wide, provided that if such alley be less than sixteen feet wide, and the lot be estimated on a line sixteen feet from the opposite side of the alley, such lot may be considered a corner lot. Any portion of the width of such lot



PLAN.

Fig. 11.

SECTION 640 a b.

Height of Tenement House; How Measured.

A—width of widest street (in this case 3rd St.) on which tenement house No. 1 abuts.

B—width of widest street (in this case 2nd St.) on which tenement house No. 2 abuts.

C—distance tenement house No. 2 sets back from 2nd St.

D—width of 1st St., other street on which tenement house No. 2 abuts.

E—distance tenement house No. 2 sets back from 1st St.

F—allowable height, which in this illustration is measured as shown by the perpendicular distance from the inside sidewalk grade of the street nearest the building, to the highest point of the external bearing walls. For exceptions, where elevator enclosures and cornices or bulkheads are used, see section 640 b, last paragraph.

Explanation:

F—tenement house No. 1 shall not exceed $1\frac{1}{2}$ A.
F—tenement house No. 2 shall not exceed $1\frac{1}{2}$ (B+C) unless $1\frac{1}{2}$ (D+E) is greater than $1\frac{1}{2}$ (B+C). then F shall not exceed $1\frac{1}{2}$ (D+E).

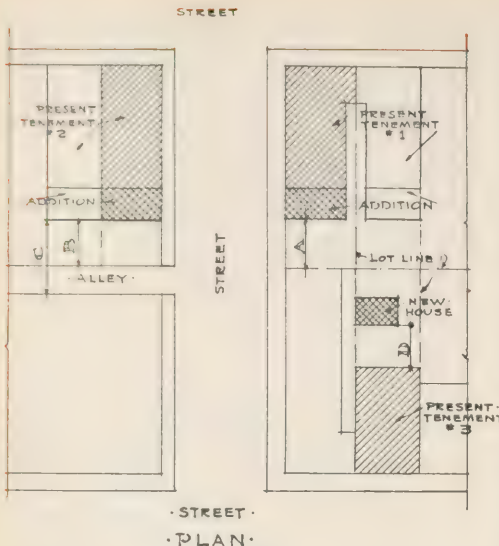


Fig. 12.

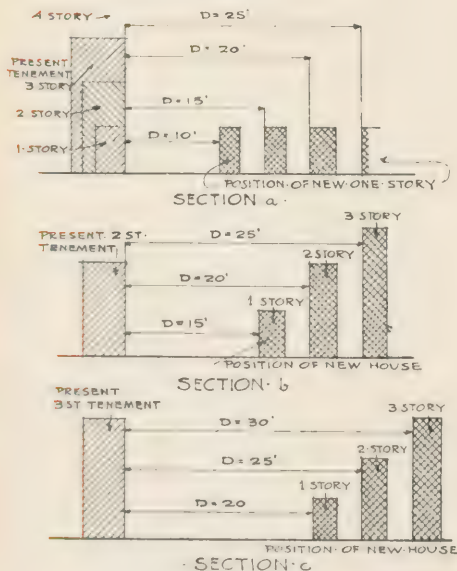


Fig. 13.

SECTION 641

A—distance from rear line of addition, to present tenement house No. 1, to rear line of lot.

B—distance from rear line of addition, to present tenement house No. 2, to rear line of lot, abutting public alley.

C—distance from rear line of addition, to present tenement house No. 2, to opposite side of such alley.

D—distance from present tenement house No. 3, standing on an inner lot, to new building.

Explanation:

A shall not be less than 10 ft. either by addition to, or diminishing present tenement house No. 1.

If B is less than 10 ft., then C must not be less than 16 ft. Sections a, b, c, are explanatory diagrams of different cases of required distances D, between tenement house No. 3 and new house. Exception to this rule is stated in last paragraph of Section 641.

641 Distance Between Buildings.) No existing tenement house shall hereafter be enlarged or its lot be diminished, so that the rear line of any building on such lot approaches nearer than ten feet to the rear line of the lot, unless the rear of the lot upon which it stands, abuts upon a public alley, in which case the rear line of such building shall be not less than sixteen feet from the opposite side of such alley. Where a tenement house, now existing or hereafter erected, stands upon a lot other than a corner lot, no other building shall hereafter be placed upon the front or rear of that lot, unless the minimum distance between such buildings be at least ten feet, if neither building exceeds the height of one story; or fifteen feet, if either building exceeds the height of one story, but not the height of two stories, and so on, five additional feet to be added to such minimum distance of ten feet for every story more than one, in the height of the highest building on such lot; Provided, that a one-story building without basement, and not used for habitation, may be placed on the rear of a lot containing a tenement house, if a minimum distance of ten feet is maintained between every point of such building and the tenement house.

642. Percentage of Area Allowed to be Covered.) No existing tenement house shall hereafter be enlarged nor its lot be diminished, nor other buildings be placed on its lot, nor a tenement house be moved on a lot on which there is an existing building, so that after such change a larger proportion of any corner lot or other lot upon which it is situated is covered by buildings, than the following proportions, respectively: No new tenement house alone or with other buildings now or hereafter erected, shall occupy above the first story more than eighty-five per centum of the area of a corner lot, provided that in the case of a fireproof building, in which the windows of every habitable room open directly on a street, the portion of the lot covered may be ninety per centum of the area of said lot, subject to the requirement that a ten foot space must be left above the first story opposite the lesser frontage; or more than ninety per centum of the area of such corner lot if such corner lot is bounded on at least three sides by streets or alleys; or more than seventy-five per centum of the area of any other lot, except that the space occupied by fire escapes, constructed and erected according to law and not more than four feet wide, shall be deemed unoccupied. Provided, however, that in case of a lot, triangular or irregular in shape bounded on two or more sides by a street and having a number of lineal feet street frontage exceeding one-twentieth of the number of square feet in the area of such lot, it shall not be necessary to comply with the conditions of this section as to percentage of lot which may be covered.

643. Must Have Alley or Yard in Rear—Size of Yard Increased.)

At the rear of every lot containing a tenement house, there shall be a yard open and unobstructed from the earth to the sky, except by fire escapes not more than four feet wide, constructed and erected according to law, unless the rear of such lot abuts upon a public alley at least ten feet wide, in which case the rear line of such building shall be not less than 16 feet from the opposite side of such alley; every part of such yard shall be directly accessible from every other part thereof; such yard shall have an area of at least eight per centum of the superficial area of the lot on corner lots except as otherwise provided in this section; and on other lots, such yards shall have an area of at least ten per centum of the superficial area of the lot. Every such yard shall be increased one per centum of the superficial

area of the lot for every story above three stories in height of the tenement house situated thereon.

644. **Courts—Inner—Outer—Lot Line.)** (a) "Inner courts" of all new tenement houses as defined in Section 634 of this ordinance, shall have minimum widths at every point and minimum areas as follows:

Courts— Height of	Least width in feet.	Least area in square feet.
1 story	6.....	100
2 stories	6.....	120
3 stories	8.....	160
4 stories	8.....	160
5 stories	12.....	260
6 stories	16.....	400
7 stories	20.....	625
8 stories or more.	24.....	840

(b) The height of a court shall be the number of stories having habitable rooms with windows in its walls.

(c) "Outer courts" and "lot line courts" of all new tenement houses as defined in Section 634 of this chapter shall have minimum widths at every point equal to one-half of the minimum widths required by this section, and lot line courts shall have minimum areas equal to one-half of the minimum areas required herein for "inner courts." If an outer court or lot line court has windows on opposite sides, its minimum width shall conform to the width given in the table.

(d) The minimum widths hereinbefore specified for outer courts and the minimum widths and areas specified for lot line courts are to be provided irrespective of the presence of or dimensions of courts on other premises bounded by the same lot line.

(e) Every "inner court" and every "lot line court" of every new tenement shall be connected directly with a street, alley, yard, or outer court by an opening extending from grade at the building to a height of at least fifteen feet, and kept unobstructed save by an openwork grill or gate, such opening to be at least two feet wide for an inner court and one foot wide for a lot line court. In case of a three-story tenement on a lot twenty-five feet or less in width, a continuous lot line passage open to the sky, and six inches in width, shall be accepted for the opening specified above as one foot wide for a lot line court. If such inner court or lot line court starts from any point above finished grade at building, such starting point shall be considered as grade for purpose of determining the location of the opening to outer air herein specified.

(f) In case of a three-story tenement on a lot of twenty-five feet or less in width, a continuous lot line passage open to the sky, and at least three feet wide, shall be accepted in lieu of a lot line court or outer court hereinbefore specified in Paragraph (a).

(a) In case of a three-story tenement on a lot thirty feet or less but more than 25 feet in width, a continuous lot line passage open to the sky, and at least three feet six inches wide shall be accepted in lieu of a lot line court or outer court hereinbefore specified in Paragraph (a).

(g) In case of a two-story tenement on a lot twenty-five feet or less in width, a lot line court having an area of at least fifty square feet shall be accepted in lieu of a lot line court heretofore specified in Paragraph (a) of this section, and in case of a three-story tenement on a lot of twenty-five feet or less in width, a lot line court having an area of at least sixty square feet shall be accepted in lieu of a lot line court hereinbefore specified and required by Paragraph (a) of this section.

(h) In case of two or three-story tene-

ment buildings on lots twenty-five feet or less in width, where there is only one apartment on each story containing not more than four rooms in such apartment, the light courts hereinbefore specified in Paragraph (a) may be omitted, provided there is a continuous passageway open to the sky and not less than three feet wide on one side of said building.

645. **Vent Shafts—Area Of.)** (a) "Vent shafts" of all new tenement houses, as defined in Section 634 of this ordinance, shall have minimum widths at every point and minimum areas as follows:

Height of Vent shafts	Least width in feet	Least area in square feet.
1 story	3.....	21
2 stories	3.....	22½
3 stories	3.....	27
4 stories	3.....	36
5 stories	5.....	48
6 stories	6.....	72
7 stories	8.....	96
8 stories or more.	8.....	120

(b) Every such vent shaft in every new tenement house more than two stories high, shall be connected directly with a street, alley, yard or court by one or more horizontal ducts or intakes at a level not lower than the finished grade of building nor higher than second story floor; the total area of such ducts to be not less than three per cent of the area of such vent shaft, and no single duct to be of less area than one hundred square inches; such total and individual duct area shall be net over and above all obstructions.

646. **Stair Hall and Shaft—Well-Hole Dimensions.)** (a) Every public stair hall in every new tenement house shall, for each story, have a window of an area of at least twelve square feet, opening directly on a street, alley, yard or court; or on a shaft of minimum area, as hereinafter provided; or shall have an unobstructed vertical well-hole of the following minimum area at each floor line above the first, and, directly over such well-hole, there shall be a skylight or twice the following minimum area:

Building— Height of	Least area in square feet of stair shaft or well hole.
2 stories—if there is more than one apartment on a floor.....	8
3 stories—if there is more than one apartment on a floor.....	13
4 stories	19
5 stories	25
6 stories or more.....	38

(b) Such window, if any, shall be so placed that light may pass directly to the opposite end of the hall, or else there shall be at least one window opening directly upon a street, alley, yard or court in every twenty feet in length or fraction thereof of such hall, except in so much of any entrance hall as lies between the entrance and the flight of stairs nearest the entrance.

In any such public hall, recesses or returns, the length of which does not exceed twice the width of the hall, will be permitted, without an additional window, but, otherwise, each recess or return shall be regarded for the purposes of this section as if it were a separate hall. Any part of a public hall which is shut off from any other part by a door or doors shall be deemed a separate public hall within the meaning of this section.

(c) Skylights shall be ventilating skylights and shall have over them a wire netting mounted on wire frame and 6-inch iron legs, of wire not lighter than No. 12 and with mesh not coarser than one inch by one inch, unless constructed of wired glass or prismatic light glass.

647. Rooms—Size and Height Of—Attic Rooms.) (a) In every new tenement house, all habitable rooms shall be of the following minimum sizes:

(b) In each apartment, there shall be at least one room containing not less than one hundred twenty square feet of floor area, and every other room shall contain at least eighty square feet of floor area, provided, however, that in the case of a room having a window not less than eighteen feet in area opening upon a public street, the floor area need not be greater than seventy feet. Each room shall be in every part not less than eight feet six inches high from the finished floor to the finished ceiling; provided, however, an attic room need be eight feet six inches high in but one-half of its area, in case there are not less than 750 cubic feet of air space therein.

648. Alcoves and Alcove Rooms.) (a) For the purpose of buildings of Classes III and IV, an alcove shall be defined as a recess connected with or at the side of a larger room. The floor of such an alcove shall be counted as a part of the floor area and its cubic contents as a part of the cubic contents of the room with which it is connected.

(b) In every new tenement house every alcove shall be deemed a separate room for all purposes within the meaning of this chapter, except an alcove that has a floor area of not to exceed thirty-five square feet and that has an unobstructed opening, equal in area to twenty per centum of its entire wall surface, into an adjoining habitable room; provided that in constructing additional habitable rooms by raising or altering existing one story dwellings, the limitation of the floor area of an alcove may be disregarded, provided such alcove has an unobstructed opening, equal to the floor area of such alcove, into an adjoining habitable room.

(c) This section shall not be construed as forbidding the erection of pilasters or other decorative effects projecting not more than eighteen inches from the plane of the wall of a habitable room.

(d) No part of any room in a tenement house shall be enclosed or sub-divided at any time, wholly or in part, by a curtain, portiere, fixed or movable partition or other contrivances or device, unless each part of the room so enclosed or sub-divided shall contain a separate window as herein required, and shall have a floor area of not less than 80 square feet as herein required for habitable rooms, except as heretofore provided in this section.

649. Air—Quantity of for Each Person.) No room in any tenement house shall be occupied so that the allowance of air to each adult person living or sleeping in such room shall at any time be less than four hundred cubic feet or less than two hundred cubic feet for each person under twelve years of age.

650. Habitable Rooms—Bath Rooms—Pantries—Requirement as to Ventilation and Lighting.) (a) In every new tenement house every habitable room shall have a window or windows with a total glass area equal to at least one-tenth of its floor area opening onto a street, alley, yard or court. None of such required windows shall have a glass area of less than ten square feet, and each such window shall have its top not less than even feet above the floor and shall be so constructed that at least its upper half may be opened its full width.

(b) In every new tenement house every bath room, water closet, or urinal compartment shall have at least one window with a glass area of at least six square feet and a minimum width of one foot, opening upon a street, alley, yard, court or vent shaft.

(c) In every new tenement house every

pantry shall have at least one window of not less than six square feet in area, with a width of not less than one foot, opening into a street, alley, yard, court or vent shaft, which vent shaft shall be at least six square feet in area.

(See Illustration Sec. 470B.)

651. New Tenements—Habitable Rooms in Basements—Prohibited in Cellars.) In no new tenement house shall any room in the cellar be constructed, altered, converted or occupied for living purposes; and no room in the basement of a new tenement house shall be constructed, altered, converted or occupied for living purposes unless such rooms shall be at least eight feet six inches high in the clear and shall have at least one-half of such height above the finished grade of said premises at the building, and at least four feet three inches of such height above the average street grade at the building.

652. Tenement Houses—Requirements for Fireproof and Slow-burning Construction.) Every new tenement house more than five stories and basement high shall be of fireproof construction. Every new tenement house more than three stories and basement high, but not more than five stories and basement high shall be of slow-burning or fireproof construction. In case slow-burning construction be required, the cellar and basement construction, including the floor construction of the first story above the cellar or basement, shall be of fireproof construction.

653. Frame Tenement—Requirements.) In every new frame tenement house outside the fire limits, each suite of apartments shall be separated from the next suite in such building by a partition of four-inch tile or of metal studding and metal lath, and the enclosing walls around the stairs, where there are two or more apartments on a floor, shall be of fireproof construction or of solid masonry of the same dimensions as are required by Section 732.

654. Frame Additions to Frame Tenement Houses Within Fire Limits Not Permitted—removal of Frame Tenement Houses.) No frame addition shall be permitted to any frame tenement house within the fire limits, either by adding to its height or its superficial area.

If a tenement house, standing on wooden supports, is moved to another lot, it shall not again be placed on wooden supports, but shall be placed on a masonry or concrete foundation.

If a frame tenement house, not more than two stories high, is moved from one location to another upon the same lot, it may be set upon wooden posts and a basement or cellar not to exceed six feet six inches in height from the floor to the ceiling thereof may be maintained thereunder, and no habitable rooms shall be constructed or occupied in said basement or cellar.

655. Entrance Halls—Solid Masonry—Exceptions—Ceilings.) Every main entrance hall in a new tenement house shall be at least three feet six inches wide in the clear from the entrance up to and including the stair enclosure and beyond this point at least three feet wide in the clear. In every new non-fireproof tenement house, except where there be only one apartment on each floor, such entrance hall shall be inclosed with solid masonry walls and with ceilings covered with incombustible material and shall comply with all the conditions of the following sections of this ordinance as to the construction of stair halls. If such main entrance hall is the only entrance to more than one flight of stairs, the several portions of such main entrance hall which separate the entrance of the building from the several flights of stairs, respectively,

shall be increased respectively at least one foot in width for each additional flight of stairs.

656. Stair Halls—Construction of—Handrails.) (a) The stairs and stair halls in all new tenement houses more than three stories and basement or cellar high shall be constructed of incombustible material throughout, except that the treads of stairs may be of wood not less than one and three-eighths inches thick and all handrails may be of hardwood.

(b) In every new non-fireproof tenement house all stair halls shall be enclosed on all sides with walls of solid masonry of the dimensions required by Section 732. All windows in stair halls, except where same open into a street, alley, outer court, or yard, shall have metal frames and sashes, glazed with wired glass. This section shall not apply to tenement houses which are not more than three stories and basement high with only one apartment on each floor. Where the main entrance vestibule and entrance hall or corridor of said building, including the floor and ceiling thereof, are of fireproof construction as defined in this chapter, from the outside face of the building at said entrance to and including the floor of

stair hall, and all doors leading therefrom or thereto except the street doors are fire-retarding doors, the floor of said entrance and vestibule may be built at a level of two inches (2 in.) above the level of the outside grade of the building at the entrance of same, without changing the definition of the word "Basement" with regard to height of floors, as contained in Section 634.

(See Illustration Sec. 613.)

657. Apartments Divided by Masonry.)

(a) There shall be a wall of solid masonry of thickness as required by Section 732 extending from the ground to the roof between each set of apartments and around each court and each light shaft, except as hereinafter provided; (1) provided, however, that a wall between apartments and extending from the main stair hall to the outer wall of the building may be offset at the second story floor line to some point nearer the center of the building, or of the group of apartments, to admit of an even distribution of space in the rooms adjacent to such wall, if such wall is supported at the second story floor line on fireproofed steel or iron beams which extend from the brick wall surrounding the main stair hall to the outer wall of the building; and provided, further, that such offset wall may be reduced to the thickness of eight inches, if supported at each floor line above the first story on fireproofed steel or iron beams carried by masonry walls as above specified; (2) and provided, that, in case there is a store or stores in the first story of a building of this class, a masonry dividing wall between apartments may begin at the second story floor line, if such dividing wall is supported on fireproofed steel or iron beams carried by masonry; and provided, further, that such dividing wall may be reduced to the thickness of eight inches, if supported at each floor line above the first story on fireproofed steel or iron beams carried by masonry. In buildings of fireproof construction the partitions between apartments, and around stairs may be of burnt clay tile not less than three inches in thickness or reinforced concrete partitions not less than three inches in thickness.

(b) In buildings of ordinary construction two separate thicknesses of metal lath and fire-resisting plaster shall be used as fireproofing as required by this section.

658. Ceiling Over Stores—Courts and Shafts Beginning Above First Story.) (a)

In every new non-fireproof tenement house in which there is a store or stores in the first story, if the building is three stories or less in height, the portions of the first story ceiling directly under all public halls shall be of slow-burning construction, and if the building is four or more stories in height the entire basement and first story construction and the second story construction shall be of fireproof construction.

(b) In every new non-fireproof tenement house the masonry walls enclosing every court or light or vent shaft beginning above the first story shall be supported on fireproofed steel or iron beams carried by masonry or by fireproofed steel or iron columns; and such court or shaft enclosing walls may be reduced to the thickness of eight inches if supported at every intersecting floor line on fireproofed steel or iron beams carried as above specified.

659. Damp-Proofing—Basement Wall to Be Masonry—Cement Floor.) In every new tenement house constructed of brick or frame, the foundations and basement walls shall be built of masonry or concrete not less than twelve inches in thickness, except as provided in Section 732 and shall have all outside walls below the adjacent ground level plastered on the outside with Portland cement or treated with other ap-

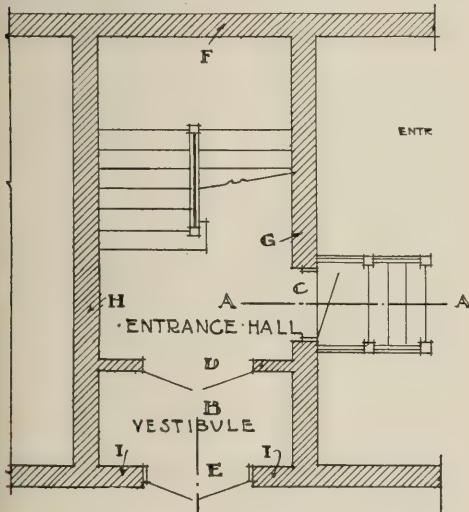


Fig. 14.

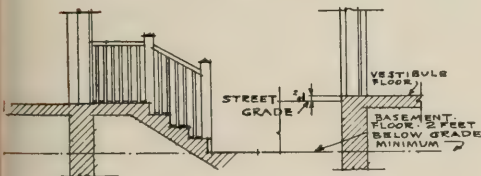


Fig. 15.

SECTION 656 B.

Beginning, where the main entrance vestibule, etc. If walls F H G I, also floor and ceiling of entrance hall A, and floors and ceiling of vestibule B, are of fireproof construction, and door C is a fireproof door with fireproof frames, the vestibule B may be built 2" above level of outside grade without changing the definition of the word "basement"—see section 634.

Doors E and D do not have to be fireproof—see section AA and BB for condition at hand.

proved damp-proofing material, and such walls, as high as the ground level, shall be laid in cement mortar. The basement or cellar of every existing and new tenement house shall have a floor of Portland cement concrete not less than three inches in thickness laid on not less than six inches of sand or cinders.

(See Illustration Sec. 634.)

660. Bay Windows—Courts—Vent Shafts.)

(a) The walls of every bay window and every court in masonry constructed new tenement houses shall be built of brick or other fireproof construction as required for exterior walls.

(b) The walls of every interior vent shaft in masonry constructed tenement houses shall be built of masonry or of fireproof material not less than four inches in thickness, supported by steel or iron.

661. Porches.) (a) Where porches are constructed in courts of now existing or new tenement houses, the amount of area of unobstructed space in such courts shall be exclusive of space occupied by stairs and porches. No additional rear porch shall be constructed on any existing tenement house in such way that the buildings on the lot with all their porches shall occupy a greater proportion of the lot than is permitted in Section 642 of this chapter. No rear porch on any existing tenement house where the total area of buildings and all porches exceeds the proportion of the lot permitted in Section 642 of this chapter shall be reconstructed until the plan for such reconstruction shall have been submitted to and approved by the Commissioner of Buildings. No rear porch built of combustible materials and more than eight feet in width, excepting stairways, shall be constructed on any new tenement house nor added to, nor reconstructed on any existing tenement house.

(b) Front porches of buildings in existence at the time of the passage of this ordinance may be enclosed temporarily from the first day of November in each year to the first day of the following May with wood sash glazed with ordinary glass; provided that the glass area shall be as large as is consistent with good construction and the ordinances of the city; and further provided, that the sashes are fitted with hinges or hung in such a manner as to allow them to open at least one-half of their area, or that one-half of all the sash installed are so fitted or hung as to open their entire area, and the area of such open sash shall be at least twice the area of all windows from adjacent rooms opening on to porches so enclosed, unless such room adjoining said porch shall have windows opening on to a street, alley, yard or court of proper legal dimensions as required by this chapter for habitable rooms in addition to the windows opening on to the porch, in which case the amount of movable sash in porch enclosure shall be not less than ten per cent of the floor area of said porch and in no case less than ten square feet of glass area.

(c) Rear porches and side porches of buildings in existence at the time of the passage of this ordinance, where every part of said porch is at least ten feet distant from any other building, porch or structure located upon the same lot with the building of which such porch is a part, may be enclosed temporarily from the first day of November in each year to the first day of the following May with wood sash glazed with ordinary glass; provided, that the glass area of the enclosure shall be as large as is consistent with good construction and the ordinances of the city; and further provided, that the sashes are fitted with hinges or hung in such a manner as to allow them to open at least one-half their area, or that one-half of all the sash installed are so fitted or hung as to open their entire area, and in

no case shall be less than three times the area of all windows, doors and transoms opening on to said porch, and that in every case the top of the sash in such enclosure shall be at least six inches higher than the top of the windows and doors opening on to such porch. The framing of the porch enclosure may be of wood, and the glass area of each side and of each end of such porch shall be not less than fifty per cent of the entire side or end of such porch enclosure measured from the floor of the porch to the under side of joists immediately above such porch in each story.

(d) In every building erected after the passage of this ordinance, every front porch, rear porch or side porch which is intended to be enclosed must have enclosing walls as required by the ordinances of the city for enclosing walls of a building of the type of which said porch is a part, and every porch so enclosed shall be considered a separate habitable room and shall comply with all the requirements of this chapter for habitable rooms, and such porch enclosure shall not in any manner intercept the light or the ventilation of any adjoining room.

(e) Where buildings do not exceed three stories in height the stairways in rear porches may be partially enclosed as follows; the end of the porch outside the stairway, also the back of the porch around said stairway not to exceed eleven feet in extent, may be enclosed with wood or frame construction and a window with glass area of nine square feet shall be placed in the back enclosure or in that part of the porch facing the yard or court on each story.

662. Flues and Chimneys.) In every building used for the purposes of Class VI, the flues or chimneys shall conform to the following regulations: For one stove opening, the flue area shall be not less than forty-nine square inches. For more than one stove opening and one furnace opening, the flue area shall be not less than seventy-seven square inches. All such flues shall be constructed according to the requirements of Section 800 of this chapter.

663. Bulkhead in Roof—Construction of—When Required.) There shall be in the roof of every new tenement house, unless the pitch of the roof thereof exceeds one foot rise in four foot run, at least one bulkhead or scuttle, fireproof or covered with fireproof material, with stairs or ladder leading thereto; no such roof opening shall be less than two feet by three feet. Where such tenement house is provided with rear stairs, there shall be a bulkhead or scuttle accessible from each of such rear stairs. No scuttle or bulkhead door shall have any lock on it but may be fastened on the inside by movable bolts or hooks.

664. Stairways—Width and Construction of—Handrails.) (a) Every now existing and every new tenement house shall have at least two flights of stairs, which shall extend from the entrance floor to the top story, and which stairs shall be as far apart as practicable. One of said stairways shall be an interior stairway. Such stairs and the public halls in every tenement house shall each be at least three feet wide in the clear, and every apartment shall be directly accessible from both such flights of stairs without going through any other apartment. An apartment whose gross floor area does not exceed 1,000 square feet and having not to exceed six habitable rooms in an existing tenement house, and which at the time of the passage of this ordinance had not access to two stairways, may have exit to a second stairway through another apartment, providing the door between the two apartments is equipped with a glass panel not less than five feet high and twenty inches wide, with the bottom of same not

less than eighteen inches above the floor. Or where the floor level of said apartment is not more than twelve feet above the surface of the yard or ground surrounding the building, a balcony with an area not less than eighteen square feet equipped with a drop ladder to the ground may be attached to the outside wall of said building accessible by a door or window from such apartment. Such glass panel, door or balcony and ladder, as the case may be, shall be considered as a secondary means of exit from said apartment, if in the judgment of the Commissioner of Buildings such glass panel door, balcony and ladder will afford safe means of exit for any such apartment. Where halls or stairs in an existing tenement house have been damaged by fire or otherwise to an extent greater than one-half the value thereof, such halls or stairs so damaged shall be repaired so as to conform to the requirements of this chapter with regard to halls and stairways relating to new tenement houses.

(b) All enclosed stairs in every tenement house shall have at least one handrail, and where the width of such stairs is greater than 3 feet 6 inches, such stairs shall have a handrail on each side thereof. All open stairs shall be provided with suitable and substantial handrails on each side.

(See Illustration Sec. 613).

665. Stairs in Non-Fireproof Buildings, Eighty or More Rooms.) Every new non-fireproof tenement house containing over eighty rooms, exclusive of bath rooms, shall have one additional flight of stairs, over and above the flights hereinbefore provided for, for every additional eighty rooms, or fraction thereof; but if such building contains not more than one hundred and twenty rooms, exclusive of bath rooms, at the owner's option, in lieu of an additional stairway, the stairs and public halls throughout the entire building shall be at least one-half wider than is provided in this chapter.

666. Stairs in Fireproof Buildings, One Hundred and Twenty Rooms and Upward.) Every new fireproof tenement house containing over one hundred and twenty rooms, exclusive of bath rooms, shall have one additional flight of stairs, over and above the flights hereinbefore provided for, for every additional one hundred and twenty rooms or fraction thereof; but if such building contains not more than one hundred and eighty rooms, exclusive of bath rooms, at the owner's option, in lieu of an additional stairway, the stairs and public halls throughout the entire building may be made at least one-half wider than is provided in this chapter.

667. Stairs—Entrance to—Treads and Risers.) Every flight of stairs required in a tenement house shall have an entrance on the entrance floor from a street or alley, or from a yard or court which opens into a street or alley. All stairs except rear stairs, in new tenement houses, shall have risers not more than seven and three-quarters inches high and treads not less than nine and one-half inches wide exclusive of nosings, except in winding stairs, where all treads at a point eighteen inches from the strings on the well side shall be at least nine and one-half inches wide, exclusive of nosings.

(See Illustration Sec. 613).

668. Fire Escapes.) Every tenement house four or more stories in height shall be provided with a fire escape or fire escapes, such as are required by this chapter. In every case each separate apartment shall have direct access to at least one such fire escape unless such apartment shall have direct access, without passing through any other apartment, to at least two separate flights of stairs leading to the ground, one of which is placed in front and one in the

rear of such building, and one of which may be placed outside of the building; but where such separate apartment shall not have access to two such flights of stairs, then such apartment shall have direct access to a stairway fire escape. Every court in which there is a fire escape shall have direct and unobstructed access along the surface of the ground to a street or alley or to yard opening into an alley or street without entering into or passing through or over any building unless by a four foot wide fireproof passage on the court or ground level. Except as herein specifically provided, the number, location, material and construction of fire escapes shall be controlled by the general provisions of this chapter on fire escapes.

669. Shafts, Courts, Yards, Graded—Drained.) In every now existing and new tenement house, the bottom of all shafts, courts or yards shall be provided with sanitary drainage and shall be graded or paved.

670. Access to Rooms—Otherwise than Through Bedroom.) In each apartment in every new tenement house, access to every living room and bedroom, and to at least one water closet compartment shall be had without passing through any bedroom.

671. Water Closets—Window in—Artificial Light.) (a) In every new tenement house there shall be a separate water closet in a separate compartment within each apartment, except that where there are apartments consisting of only one or two rooms, in which case there shall be at least one water closet for every two apartments.

(b) Every water closet compartment in every existing tenement house shall be ventilated by such a window, or else by a vent shaft of at least one-half the minimum area required in Section 645. Every water closet compartment in every tenement house shall be provided with proper means of artificially lighting the same. If fixtures for gas or electricity are not provided in any such compartment, then the door thereof shall have ground glass panels or transoms.

672. Sinks—Requirements.) In every new tenement house there shall be in each apartment at least one kitchen sink with running water. In every existing tenement if there be not one such sink in each apartment there shall be on every floor at least one kitchen sink with running water, accessible to all the tenants of the floor, without passing through any other apartment. In no tenement house shall there be woodwork inclosing sinks; the space underneath sinks shall be left entirely open.

673. Pipes Through Floors—Catch Basins—Water Closets.) (a) In every new tenement house where plumbing or other pipes pass through floors or partitions, the openings around such pipes shall be sealed tight with plaster or other incombustible material, so as to prevent the passage of air or the spread of fire from one floor to another or from room to room.

(b) In the premises of a tenement house the catchbasin shall, whenever practicable, be placed in a court or yard, and shall be covered with a stone or iron cover, flush with the surface so that access to such basin shall be convenient.

(c) Where it is for any reason impracticable to place a catchbasin in a court or yard, the Commissioner of Health may authorize the use of an iron catchbasin with airtight cover, located in the cellar or basement.

674. Buildings Damaged by Fire, Etc.) If any existing tenement house is hereafter damaged by fire or other cause, including ordinary wear, so that at any time its value be less than one-half its original value ex-

clusive of the value of the foundations, such building shall not be repaired or rebuilt except in conformity with the provisions of this ordinance applicable to new tenement houses.

675. Provisions of this Article Not to Apply to Existing Buildings, Except Under Certain Circumstances—Then Commissioner to Notify.) (a) Nothing in this Article contained shall be construed as requiring alterations in the construction or equipment of buildings in existence at the time of the passage of this Article and which at the time of their construction were built in compliance with the ordinances then in force, unless they are in conflict with the requirements of Section 649, 668, 669, 672, 677, 678, and 679 or unless such buildings shall not have sufficient or adequate means of egress therefrom, by reason of insufficient or inadequate stairways, improperly located or insufficient or inadequate elevators or elevator equipment, doors, fire escapes, windows or other means of egress or ingress.

(b) Where it shall appear to the Commissioner of Buildings that any such building has insufficient means of egress therefrom as aforesaid, he shall notify the owner, agent or person in possession, charge or control of such building of such fact and direct him forthwith to make such alterations and changes in the construction or equipment of such building, as are necessary to be made in order to promote the safety of the occupants of such building and of persons using the same and of the public.

676. Rooms and Halls—Additional.) Every room or hall that may hereafter be constructed or created in an existing tenement house shall comply in all respects with the provisions of this ordinance as to size, arrangement, light and ventilation of rooms and halls.

677. Rooms—Change in Existing.) No room in any now existing tenement house shall hereafter be constructed, altered, converted or occupied for living purposes, unless it contains a window having a superficial area not less than one-twelfth of the floor area of the room, which window shall open upon a street or alley or upon a yard or court having a superficial area of not less than twenty-five square feet and a minimum width of not less than two feet six inches, or unless such room adjoins another room in the same apartment, which other room shall have such a window opening upon such a street, alley, yard or court, between which two adjoining rooms there shall be an alcove opening equal in extent to at least 20 per cent of the entire wall surface of said room, provided, however, that all of the requirements of Sections 641 and 642 shall be complied with.

Where a frame tenement house is moved from one lot to another, or from one location to another on the same lot, it shall comply with the provisions of Section 654 of this Chapter.

(See Illustration Sec. 470 B).

678. Windows—Courts—Attic.) No room in any now existing tenement house, which has no such window as aforesaid, opening upon a street or alley or upon a yard or court having a superficial area of not less than twenty-five square feet, shall hereafter be constructed, altered, converted or occupied for living purposes, unless it contains a floor area of at least sixty square feet and also at least six hundred cubic feet of air space; nor unless every part of the finished ceiling of such room be at least seven feet six inches distant from every part of the finished floor thereof; provided, that an attic room need be seven feet six inches high in but one-half of its area, and, provided, further, that such attic room has not less than seven hundred fifty cubic feet of

air space therein; and such attic room shall not be used for purposes of human habitation other than as a sleeping room.

(See Illustration Sec. 470 B).

679. Existing Tenements—Living Rooms in Cellars or Basements—When Permitted.)

(a) In every existing tenement house, no room in an existing cellar or basement shall be occupied for living purposes unless such room shall be at least seven feet six inches high in the clear, and have not more than four feet eight inches of such cellar or basement below the finished grade at building; provided that no such room shall be used for living purposes unless such room shall have a window opening upon a street, alley, yard or court, and, provided, that when the windows of any living room front solely upon a street and the floor of such basement is four feet eight inches below the sidewalk grade, such windows shall be located not less than three feet back of the lot line; provided, however, that in every case where the height of ceiling of any living room is less than eight feet six inches in the clear, the window area of such room shall be at least 15 per centum of the floor area.

(b) When a brick or frame tenement house is moved from one lot to another or from one location to another on the same lot and a basement or story, or both, is constructed under the same, the total height of which is more than six feet six inches from the floor to the ceiling, the walls of such basement shall be constructed of masonry according to the provisions of Section 872, and the habitable rooms therein shall comply with the provisions of Section 677, and the space on the lot shall comply with the provisions of Section 641 and Section 642.

680. Insanitary Conditions—Nuisance.) A tenement house or part thereof which is in an insanitary condition by reason of the basement or cellar being damp or wet, or by reason of the floor of such basement or cellar being covered with stagnant water or by reason of the presence of sewer gas, or by reason of any portion of such building being infected with disease, or being unfit for human habitation, or which by reason of any other insanitary condition is a source of producing sickness among the inhabitants of this city, or which in any way endangers the public health, is hereby declared to constitute a public nuisance.

ARTICLE X.

Class VII.

681. Class VII Defined.) In Class VII shall be included every building used for the sale at retail of dry goods and other articles of general merchandise and commonly known and described as a department store.

682. Must Comply With General and Special Provisions.) Every building of Class VII shall comply with the general provisions of this chapter, and, in addition to the general provisions, shall comply with the following special provisions:

683. Buildings of Class VII—Construction of.) Buildings three stories or less in height, used either wholly or in part for the purpose of Class VII, may be of ordinary construction. Such buildings more than three and not exceeding five stories in height shall be of slow-burning, mill or fireproof construction. Such buildings over five stories in height shall be of fireproof construction.

684. Stores Used for Retail Sale of Goods or Manufacturing Purposes—Occupation of Basement—Lockers.) (a) Not more than the lower twelve stories above the street grade shall be used for the retail sale of goods, or for locker provisions in excess of accommodations for the number of em-

ployes on the floor on which they are employed, or for manufacturing purposes in a building devoted wholly or in part to purposes of Class VII except as hereinafter provided; provided, however, the stories above the twelfth story may be used for these or other purposes when equipped with an approved automatic sprinkler system approved by the Chief Fire Prevention Engineer; and provided further, that all such buildings hereafter erected to be used for these purposes, or so used, above the twelfth story shall in addition to being equipped with an approved automatic sprinkling system have enclosed stairways.

(b) Not more than one floor of any basement or cellar shall be used for the retail sale of goods. Such floor shall be the floor nearest to the inside street grade. Such floor used for the retail sale of goods shall not be more than twenty feet below the inside street grade: Provided, however, that in all existing buildings of fireproof construction having a floor not more than thirty-two feet below the inside street grade, and having a partial intermediate floor or gallery between such floor and the level of the inside street grade, with an opening through such intermediate floor not less than forty feet by forty feet in area, and having direct exits on such floor and intermediate floor or gallery connecting on substantially the same levels with the floors of adjacent buildings of fireproof construction, the retail sale of goods shall be permitted on such floors not more than thirty-two feet below the inside street grade if such floors shall be properly and thoroughly ventilated and mechanically supplied with not less than two thousand cubic feet of air per hour for each twenty square feet of floor area, exclusive of walls, stairs and elevators, and if such buildings are equipped throughout and on such floors below the inside street grade with an automatic sprinkler system approved by the Chief Fire Prevention Engineer; and if the number and character of stairways and emergency exits comply with the provisions of this chapter applicable to buildings of Class VII of fireproof construction; and further provided, that in addition to the foregoing requirements there shall be at least one fireproof stairway enclosed in a fireproof tower extending from such sub-basement to the first floor of such building with no openings into said tower except from the sub-basement and first floor.

(c) Except as above provided in paragraph (b) of this section in relation to existing buildings, no sub-basement, cellar or part of a basement below such floor shall be used for the sale of any goods in any manner, but locker and dressing rooms may be placed in the sub-basement, provided the space thus occupied be separated from the remainder of the basement by fireproof partitions, and that there be at least two flights of stairs placed as far apart as practicable leading therefrom to the first floor, inclosed in fireproof partitions. Such stairs from such locker or dressing rooms shall be, in addition to other stairways required by this chapter for such buildings, and at least one of such stairways shall open directly on a street, alley or court opening on a street or alley, or on a fireproof passage leading to the street, alley or such court. Where more than five lockers are in one room, such lockers shall be of incombustible material.

(d) Where stories above the twelfth story are used for the purposes of Class VII as hereinbefore described for locker provisions in excess of accommodations for employes on the floor on which they are employed, then the stairways from the first to the topmost floor shall be built and inclosed as described in Section 880, but the stairways shall be in number and aggregate width as required in the table for stairways set forth in Section 878 of this chapter.

685. Floor Areas—Maximum.) (a) The

floor area, except as hereinafter provided, of any one story or portion of a story used for the purposes of Class VII of any building of ordinary construction shall not exceed nine thousand square feet.

(b) The floor area, except as hereinafter provided, of any one story or portion of a story used for the purposes of Class VII of any building of slow-burning or mill construction shall not exceed twelve thousand square feet.

(c) The floor area, except as hereinafter provided, of any one story or portion of a story used for the purposes of Class VII of any building of fireproof construction shall not exceed 25,000 square feet, unless the building is completely equipped with an approved automatic sprinkler system, but in no case shall such area exceed 30,000 square feet.

686. Floor Areas—Exceeding the Maximum Limits Defined in Section 685.) (a)

Where any floor or portion of a floor used for the purposes of Class VII in any building shall exceed in area the maximum number of square feet allowed in the preceding section for the type of construction of such building in which such floor is contained, each such maximum amount of floor area so used shall be separated from other parts of such floor by fire walls, or dividing walls built in accordance with the provisions of Section 463 of this chapter relating to dividing walls in buildings of Class I.

(b) Where any such floor so used is divided by such fire walls or dividing walls, each such division of such floor shall be provided with stairs, aisles, exits, and fire escapes as required in this chapter for separate and distinct buildings, and each such division shall be considered as a separate building, except as provided in Section 712 of this chapter.

687. Galleries.) (a) The area of any or all of the galleries, mezzanine or intermediate floors in any one story used wholly or in part for the purposes of Class VII in any building shall not exceed ten per centum of the area of such story. Galleries, mezzanine or intermediate floors of a larger size than the above shall be considered as full stories.

(b) Every gallery, mezzanine or intermediate floor shall have at least one stairway not less than three feet wide.

(c) The height from the floor of any gallery, mezzanine or intermediate floor to the ceiling over same shall not be less than

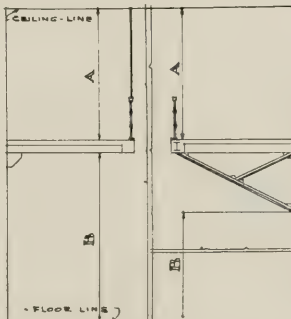


Fig. 16.
SECTION 687 C.

A—height from floor of any gallery, mezzanine or intermediate floor to ceiling over same.

B—space between the bottom of such gallery, mezzanine or intermediate floor and the floor of the story in which such gallery, etc., is placed.

Explanation:

A—shall not be less than 7'0".

B—shall not be less than 7'0".

seven feet, and there shall be not less than seven feet of space between the bottom of such gallery, mezzanine or intermediate floor and the floor of the story in which such gallery, mezzanine or intermediate floor is placed.

(d) Every gallery, mezzanine or intermediate floor in any building used for the purposes of Class VII shall be built to conform to the construction applicable to such building, but galleries not exceeding five per centum of the area of such story, may be built of incombustible material without fireproof protection.

(e) No gallery, mezzanine or intermediate floor shall be built without a permit from the Department of Buildings, and plans showing the construction and size of such proposed gallery, mezzanine or intermediate floor shall be filed with the Department of Buildings when a permit is applied for.

688. **Courts of Class VII Buildings.)** (a) Every court or light shaft of every building used wholly or in part for the purposes of Class VII shall be open and unobstructed from the bottom of such court to the sky, with the exception that fire escapes may be built therein, and such courts shall have walls constructed in the same manner as is required for the exterior walls of such buildings; provided, that no walls inclosing such courts are required on street or alley lot lines.

(b) All windows, doors or other openings in court walls of such buildings shall have metal frames, metal sashes and metal doors, with the glazed portions thereon of wired glass.

689. **Stories—Numbering of.)** The first story above the inside street grade shall be designated and known as the first story for all purposes of this chapter, and the stories above shall be numbered consecutively, the second, third, and so on.

690. **Stairs—Halls—Passageways and Aisles—Signs and Lights.)** (a) The stair halls, passageways and stair aisles shall be unobstructed and be as wide as the stair and not less than four feet wide in the clear.

(b) The exit door or doors between floors and stair halls shall be not less than ninety per centum of the width of the stairway to which they afford access, and for each elevator opening into such a stair hall, the doors to floors shall be increased six inches in width.

(c) The stairways and stair halls of any building used wholly or in part for the purpose of Class VII shall be illuminated by gas or electric light, and the gas piping and the electric wiring shall be accomplished by piping and circuits separated and distinct from the general illuminating piping and circuits of the premises. Each stair light shall have a red glass inclosure.

(d) At the bottom of each such stairway there shall be an illuminated red glass sign with the number of the story in which it is situated inscribed thereon in letters not less than six inches high.

691. **Exit Signs and Lights.)** (a) All exits in buildings used wholly or in part for the purposes of Class VII shall be clearly indicated by illuminated red signs with the word "Exit" thereon in letters not less than six inches high. At the bottom of each stairway on the street floor level there shall be similar signs indicating the direction of the nearest exit to a street or alley.

(b) Fire escape doors or windows shall be indicated by illuminated red signs with the words "Fire Escape" thereon in letters not less than six inches high.

692. **Doors at Street Level—Revolving Doors.)** The clear width of the exit openings shall be computed in the same manner as that provided in this article for main aisles,

and no door openings shall be less than five feet wide, and all doors shall swing outward. Revolving doors shall not be considered as complying with this section unless the revolving wings of such revolving doors are so arranged that by the application of a force slightly more than is necessary to revolve said doors and which one person of ordinary strength is capable of exerting, all the wings of said doors fold flat on each other and in an outward direction, or unless the revolving wings of said revolving doors are so arranged that they may be readily collapsed or removed by pressure or simple mechanical means, to be approved by the Commissioner of Buildings, and leave sufficient opening for two or more persons to pass through with a minimum width of not less than twenty-two inches on each side of said collapsed doors.

Where revolving doors are used as exits they shall be credited as exits only to the extent of the clear space remaining when the doors are collapsed, and all deficiency of required exits must be made up by additional doors.

693. **Doors in Dividing Walls.)** (a) Door openings may be built in dividing walls of such buildings; provided, however, that such door openings shall be not less than five feet in width and shall be provided with fireproof doors built as described in Section 789 of this chapter, and that each door shall have an efficient closing device which will operate automatically in the event of a fire in close proximity to either side of such door.

(b) Each such opening shall have exit signs and lights as provided for street doors and exits in Section 691 of this chapter.

694. **Loads—Allowance for Live Loads in Construction of Floors of Buildings of Class VII.)** For all buildings of Class VII the floor shall be designed and constructed in such a manner as to be capable of supporting, in addition to the weight of the floor construction, partitions, permanent fixtures and mechanisms that may be set upon the same, a live load of one hundred pounds for every square foot of surface in such floors, and shall be figured in accordance with Section 729 of this chapter.

ARTICLE XI.

Class VIII.

695. **Class VIII Defined—Provisions of.)** In Class VIII shall be included every building used for school purposes and every building containing class rooms for special or general instruction, other than halls for the purpose of instruction as included in Class IV, where such building so used shall have a seating capacity of more than fifty students.

696. **Must Comply With General and Special Provisions.)** All buildings of Class VIII shall comply with the general provisions of this chapter wherever the same are applicable thereto, and in addition to such general provisions shall comply with the following special provisions:

697. **Construction of.)** (a) All buildings hereafter erected and used or intended to be used wholly for the purposes of Class VIII shall be constructed in accordance with the provisions of this chapter relating to Class VIII; and existing school buildings shall comply with the provisions of Class VIII with reference to stairs, exits and fire escapes.

(b) Buildings which have a seating capacity of two hundred or less and which are not over two stories and basement in height, may be built of ordinary construction; provided, that no portion of such building shall be used for assembly hall purposes.

(c) Buildings which have a greater seating capacity than two hundred and not ex-

ceeding four hundred, and which are not over three stories and basement in height, shall be built of slow-burning or fireproof construction.

(d) Buildings which have a greater seating capacity than four hundred, or which are more than three stories and basement in height, shall be built entirely of fireproof construction.

(e) Additions to existing buildings shall be built of the several types of construction required by this section; provided, however, that the sum total of the seating capacity of the entire building, including additions, shall be counted in determining the type of construction required for such addition.

(f) All alterations in existing buildings used for the purposes of Class VIII, other than new additions thereto, and intended to make them comply with the requirements of this chapter, may be executed in the same kinds of materials originally used in such buildings, unless otherwise distinctly provided herein.

698. **Walls—Window Openings in.** No wall of any building used for the purposes of Class VIII and containing a window opening shall be nearer than five feet to any lot line of adjoining property, street and alley lines not included.

699. **Portable Frame Buildings.** Portable frame buildings used wholly for the purposes of Class VIII, not larger than 28 by 36 feet and not over one story high, may be erected, provided exterior walls and roof of same are covered with metal or other incombustible material, and the interior woodwork painted with fire-retarding paint approved by the Commissioner of Buildings; and, provided, further, that the location of such buildings shall be approved by the Commissioner of Buildings. Such portable buildings shall not be located nearer than ten feet to any other building, and shall not be maintained on any one lot or block for a longer period than two years after the date of the issuance of the original permit.

700. **Assembly Halls—Limitations as to Seating Capacity and Floor Level.** (a) The limit of height at floor level and the maximum seating capacity of assembly halls or auditoriums or other single rooms in buildings of this Class must not exceed the numbers given in the following table, for the specified type of construction, to-wit:

Floor— Height of Above Grade.	Type of Construction— Slow burning or Mill Construction Having Fireproof		
	Fireproof Construction.	Stairs and Corridors.	Ordinary Construc- tion.
	Persons.	Persons.	Persons.
Over 60 ft.	500	100	...
60 ft. or less..	600	300	...
45 ft. or less..	700	500	...
30 ft. or less..	1000	800	250
20 ft. or less..	1500	900	500
15 ft. or less..	2000	1000	800
5 ft. or less..	2500	1200	1000

(b) All assembly halls or other single rooms having a seating capacity larger than that given in the above table must have the highest part of the main floor within not more than one foot of grade level and must have exits leading directly to three streets, public alleys, or to open public grounds.

(c) Seating capacity of all assembly halls in buildings of this Class shall include the total aggregate seating capacity of all balconies, galleries, stages and platforms as well as the main portion of such assembly hall or rooms.

(d) Heights of assembly hall floors shall be measured from sidewalk level at entrance of building or open school grounds to highest part of main floor of such assembly hall or rooms.

701. Stairways—Width of—Handrails.)

(a) Stairways in buildings used for the purposes of Class VIII shall be equivalent in width to fifteen inches for every hundred of seating capacity in such building as measured by the aggregate seating capacity of the auditorium, assembly rooms and school rooms; provided, however, that the number of persons allowed in such buildings at any one time shall be limited by the width of stairways available as exits therefrom.

(b) No stairway shall be less than four feet in the clear, except where more than two stairways lead down from any floor, in which case stairways three feet in width in the clear may be counted in the total width of stairs required.

(c) Where two or more stairways are used, they shall be placed at opposite ends of the building or as far apart as practicable, and all such buildings hereafter erected shall have at least two separate and distinct stairways from the ground floor to the top floor, and all existing buildings shall have two such separate and distinct stairways, or one stairway and one sliding or stairway fire escape.

(d) All stairways in buildings of Class VIII shall have hand railings on each side thereof. No stairway shall ascend a greater height than thirteen feet six inches without a level landing, the dimensions of which, in the direction of the run of the stairs, shall not be less than four feet, or which, if at a turn of the stairs, shall be of not less width than the width of the stairs. No winder shall be permitted in any stairs. Stairways which are over nine feet wide shall have double intermediate hand rails with end newel posts at least five and one-half feet high at each stair landing. All stairways shall discharge at the bottom directly to a public thoroughfare or open ground.

(See Illustration Sec. 613).

702. **Stairways in Buildings Hereafter Erected—Fireproof.** In buildings hereafter erected more than two stories and basement in height, the stairways and their enclosing walls shall be of fireproof construction.

703. **Width of Corridors, Passageways, Hallways and Doorways.** The width of corridors, passageways, hallways and doorways shall be equivalent in width to eighteen inches for every one hundred of seating capacity of such portions of building as will be required to use same for exit. No corridor, passageway or hallway shall be less than five feet in width, and no doorway less than three feet in width, except where two or more doors, each two feet eight inches or more in width, are grouped together.

704. **Doors to Open Outward—Covering of.** All doors in such buildings shall open outward. All exit doors from assembly halls to other parts of the building shall be covered with metal or other fireproof material approved by the Commissioner of Buildings.

705. **Aisles—Width of—In Assembly Halls and in Recitation and Study Rooms.** (a) Aisles in assembly halls in buildings of Class VIII shall be equivalent in width to eighteen inches for every one hundred seating capacity in such assembly hall, but no such aisles shall be less than two feet six inches in its narrowest part. All groups of seats shall be so arranged that they shall have an aisle on each side, and not more than twelve seats in any one row shall be placed between aisles.

(b) Aisles in class rooms, recitation rooms and study rooms of such buildings shall be equivalent in width to eighteen inches for every one hundred permanent seats in any such room, but no aisle shall be less than sixteen inches in width and no main or cross aisle be less than two feet six inches in width.

706. Emergency Exits for Assembly Rooms—Aggregate Width of.) All assembly halls of such buildings having a seating capacity of eight hundred or more shall be provided with at least two emergency exits. The aggregate width of such emergency exits, which shall be provided for each floor, balcony or gallery of such assembly hall, shall be not less than nine inches in width for every one hundred of seating capacity or portion thereof. No emergency exit or stairway shall be less than three feet in width. Emergency exits must be located as far apart and as far from main exits as practicable, subject to the approval of the Commissioner of Buildings.

707. Lights in Buildings—Window—Skylights.) (a) Provisions shall be made to properly light every portion of any such building devoted to the uses or accommodations of the public and all outlets therefrom leading to the street, including the open courts and corridors, stairways and exits, during the entire time such building is in use.

(b) All gas or electric lights in the class rooms of main building and in halls, corridors, lobbies, stairs and exits leading from the assembly halls shall be independent of lights in assembly hall. By "independent" shall be construed a separate pipe from meter or separate circuits from switch-board.

(c) The total glass area of outside windows and skylights of each class room, recitation room or study room in such buildings shall be not less than one-fifth of the floor area of such room.

(d) Class rooms, recitation rooms and study rooms that have exterior windows on one side only must have the top of glass in such windows at a height above the floor of such room of not less than one-half of the distance to the opposite parallel wall or partition.

(e) Such rooms having exterior windows on two opposite sides of the room shall have the top of glass in such windows not less than one-fourth the distance between walls in which the windows are placed. The height of windows in corner rooms having windows in adjacent walls shall be computed from nearest wall or partition to opposite window.

(f) Where skylights or skylights and windows of sufficient size to give the proper glass area are used these heights of windows shall not be required.

708. Scenery—Sliding Curtains—Screens.) No curtains or scenery shall be used in any assembly hall, except only, that it shall be permissible to use a pair of sliding curtains hung on horizontal metal rods not over twelve feet above the floor of stage and portable screens set on the floor and not over eight feet high. Provided, however, in assembly halls located on the first floor or ground floor of a fireproof building, it shall be permissible to use curtains hung from the ceiling or top of proscenium opening.

709. Moving Picture Machines.) Moving picture machines may be installed and used in assembly halls located on the first floor or ground floor of fireproof buildings of Class VIII. When moving picture machines are so used they shall be located in booths constructed of fireproof materials with metal clad doors and a vent duct to the outside air having a cross sectional area of at least 100 square inches.

710. Basement When Used for Class Rooms.) (a) In every such building in which the lower or basement floor is below the surface of the ground surrounding such building, and is used in part or as a whole for heating or ventilating apparatus, such

floor shall be considered the basement story of such building.

(b) Class rooms, recitation rooms or study rooms shall not be allowed in basements less than twelve feet in height in the clear nor where the floor is more than two feet below the level of the sidewalk at nearest entrance of building nor in basements which are not properly lighted by windows or skylights as defined elsewhere in this Chapter for such rooms.

711. Stories—Height of.) No story above the basement shall be less than twelve feet in height in the clear.

712. Fire Escapes.) (a) Every building used for the purposes of Class VIII of four or more stories in height, shall be provided and equipped with stairway fire escapes or sliding fire escapes as herein provided:

(b) All such buildings having a seating capacity of less than two hundred on any one floor above the third floor shall have at least one such fire escape.

(c) All such buildings having a seating capacity of over two hundred but less than four hundred in any one story above the third floor shall have at least two such fire escapes.

(d) All such buildings having a seating capacity of more than four hundred but less than six hundred on any floor above the third floor shall have at least three such fire escapes.

(e) At least one additional stairway or sliding fire escape shall be provided for every increase of two hundred seating capacity in any one story above the third floor.

(f) Stairway fire escapes shall be built in accordance with the requirements of Sections 881, 882 and 885, and shall be subject to the approval of the Commissioner of Buildings.

(g) Sliding fire escapes shall be securely anchored or fastened to the building and shall have a radius or width of not less than thirty-six inches, and the inner side of the same shall be entirely smooth and made of metal. There shall be an entrance to each sliding fire escape from each floor above the first story. They shall be of a pitch of not less than thirty degrees nor more than forty-five degrees for straight runs. They shall be so constructed that they will discharge people not more than twenty-four inches from the adjacent ground or floor. They shall be of such pattern and design as will best secure the safety of the public, and their construction, location and maintenance shall be subject to the approval of the Commissioner of Buildings. Spiral sliding fire escapes shall have two complete turns for each story height of more than thirteen or less than sixteen feet.

(h) All the provisions of this Chapter relating to outside sliding or stair fire escapes shall apply to buildings of Class VIII, unless such buildings are fireproof, in which case interior fire escapes from ground to roof may be substituted for exterior fire escapes, provided such interior fire escapes shall comply with each and all of the following conditions:

(i) Interior fire escapes in fireproof buildings shall be enclosed in brick or concrete walls on all sides from top to bottom, and shall be enclosed at the top with a fireproof penthouse. The treads and risers of such interior fire escapes shall be the same as those used for stairs elsewhere in the building and the width of such fire escapes shall not be less than forty inches in their narrowest part between hand rails.

(j) The landings of such fire escapes shall, exclusive of and in addition to the space covered or occupied by swinging doors, be at least equal to the stairs in width. All doors leading to such fire escapes shall be incombustible doors and

the glass portion thereof shall be glazed with polished wired glass not less than one-quarter of an inch thick, which shall be large enough to enable persons to see other persons on the opposite side of the door. The combined width of said doors on each landing shall exceed the stair width twenty-five per cent, but no single door shall be more than three feet wide. They shall be hinged and equipped with automatic opening and closing devices and shall open outward. Windows lighting such fire escapes shall have metal frames and sash and wired glass.

(k) The number and capacity of such interior fire escapes shall in no case be less than is elsewhere in this Chapter required for outside fire escapes, and the locations of the same shall be as far apart as practicable and so placed as to best secure the safety of the persons using the same in case of fire, accident or panic.

(l) Such interior fire escapes which comply with all the conditions above enumerated may be used daily as ordinary stairs.

713. The Commissioner of Buildings, the Chief Fire Prevention Engineer, Commissioner of Gas and Electricity, and Superintendent of Police shall close Buildings for Violations.) The Commissioner of Buildings, the Chief Fire Prevention Engineer, Commissioner of Gas and Electricity, and Superintendent of police, or any of them, shall have the power to close or order closed any building used wholly or in part for the purposes of Class VIII wherein there is any violation of any ordinance which it is their duty to enforce, and to keep the same closed until such provisions are complied with.

ARTICLE XII

Class IX.

714. Class IX Defined.) In Class IX shall be included every building maintained by the City of Chicago for police station purposes.

715. Requirements General.) Every building of Class IX shall comply with the general provisions of this chapter wherever the same are applicable thereto, and in addition to the general provisions shall comply with the following special provisions:

716. Construction.) (a) All buildings of Class IX not more than two stories and basement in height may be of ordinary mill, slow-burning or fireproof construction.

(b) All buildings of Class IX more than three stories and basement high shall be built of fireproof construction.

All buildings of Class IX containing a court room or court rooms above the second story shall be built of fireproof construction.

All buildings of Class IX three stories and basement or less in height which do not contain a court room or court rooms above the second story may be built of ordinary construction excepting that part of the building containing the cell room or lockup and the patrol wagon quarters, or either of them, which part shall be built of fireproof construction and shall be separated from all other parts of the same building by a wall of the same character and thickness as is required by this chapter for the outside walls of such building and where necessary by a fireproof floor and ceiling of the same thickness as the brick walls by which said floor and ceiling is supported.

(c) Buildings erected for or converted to the use of police stations for temporary purposes may be of mill or slow-burning construction not more than ninety feet in height from the average inside sidewalk grade of the street in front of the building to the highest part of the roof of the building.

717. Allowance for Live Loads and Construction of Floors of Class IX.) The floors of all buildings of Class IX shall be designed and constructed as follows:

In all buildings of Class IX the floors of all court rooms, and of all public corridors, and of all stairways leading to same, shall be designed and constructed in such a manner as to be capable of bearing in all their parts, in addition to the weight of floor construction, partitions, permanent fixtures and mechanisms that may be set upon the same, a live load of one hundred pounds for every square foot of surface, and all other floors, or parts thereof, shall be designated and constructed so as to be capable of carrying a live load of fifty pounds for every square foot of floor surface, and such floor-bearing capacity shall be computed in accordance with this chapter.

718. Windows.) (a) In every building of Class IX every room, including court rooms, public and private offices, shall have at least one window opening directly upon a street, alley, yard or court; the total glass area of such window or windows shall not be less than one-tenth of the floor area of such room. The top of such windows shall be at least seven feet above the floor and at least the upper half of such windows shall be capable of being opened. Such window shall have a glass area of at least ten square feet unless it be a window in excess of one-tenth of the floor area as required by this paragraph. Cell blocks shall have at least three outside walls of same to face upon a street, alley, yard or court and where windows are placed in the three sides with a total glass area equal to one-fourth of the floor area of such block and each window is arranged so that it may be opened for one-half of its area, it shall not be required that each cell open onto a street, alley, yard or court. No sleeping rooms or cell rooms shall be allowed below the first floor level in any building of Class IX.

(b) In every building of Class IX every pantry, bath room, water closet and urinal compartment shall have at least one window which opens directly upon a street, alley, yard, court or vent shaft; the total glass area of such windows shall be not less than one-tenth of the floor area of such room or compartment. The top of such windows shall be at least seven feet above the floor and at least the upper half of such windows shall be capable of being opened; and no such windows shall have a glass area of less than six square feet or a glass width of less than one foot; provided, however, that such room or compartment, if located on the upper story of such building, may be lighted and ventilated by means of a skylight having a glass area of at least one-tenth the floor area of the room it serves and is equipped with an efficient ventilator or ventilators equal in effective area to one-twentieth the floor area of such room.

719. Courts and Shafts.) In every building of Class IX courts shall be of the minimum width and area as prescribed in Section 644 of this chapter and vent shafts shall be of the minimum width and area as prescribed in Section 645 of this chapter.

720. Height of Rooms.) In every building of Class IX the height of all rooms except basement rooms shall be not less than ten feet from the level of the floor to the ceiling thereof, and the height of court rooms, if any, shall not be less than eleven feet from the level of the floor to the ceiling thereof.

721. Thickness of Walls.) The walls of every building of Class IX shall comply in thickness with the requirements of Section 732 of this chapter as therein prescribed for buildings of Class I.

722. Stairways and Fire Escapes.) Every building of Class IX shall be equipped with

stairways and fire escapes in number and dimensions as follows:

In buildings of ordinary, slow-burning or mill construction which do not contain a court room or court rooms and with a floor area of 5,000 square feet or less, two stairways.

With floor area of 5,000 to 9,000 square feet, three stairways.

In buildings of ordinary, slow-burning or mill construction which contain court rooms and with a floor area of less than 5,000 square feet, two stairways and one stairway fire escape.

With floor area of 5,000 to 9,000 square feet, three stairways and one stairway fire escape.

In buildings of fireproof construction with a floor area of 7,000 square feet or less, two stairways.

With floor area of 7,000 to 15,000 square feet, three stairways.

With floor area of 15,000 to 21,000 square feet, four stairways.

All buildings of Class IX over four stories in height must be equipped with stairway fire escapes as follows:

With a floor area of 7,000 square feet or less, one stairway fire escape, three feet in width.

With a floor area of 7,000 to 21,000 square feet, two stairway fire escapes not less than three feet in width.

No stairways in buildings of Class IX shall be less than four feet in width between hand rails.

In buildings less than three stories high and in buildings three stories high which may be built of ordinary construction by the provisions of this article, stairways may be of ordinary construction enclosed in brick walls of thickness as required by paragraph (h), Sec. 732 of this chapter, or stairways may be of fireproof or incombustible material enclosed in partitions of fireproof or incombustible material.

723. Exits from Court Rooms—Handrails on Stairways.) (a) There shall be two direct exits located as far apart as practicable from every court room in a building of this class; the width of such exits shall be computed on a basis of twenty inches for each 100 persons of the aggregate capacity of such court room, and for fractional parts of 100 capacity, a proportionate part of twenty inches shall be added to the width of such exits, but no such exits shall be less than three feet wide in the clear. One of such exits shall open onto a public corridor not less than six feet wide from which there is a stairway leading to the ground at least four feet wide in the clear between hand rails. Where there is but one stairway from such public corridor an additional exit from each court room must be afforded by a stairway at least four feet wide in the clear between hand rails or by means of an outside iron stairway not less than three feet wide; the platform of which shall be placed approximately level with the floor of the court room and accessible by a door not less than three feet in width.

724. Doors to Open Outward.) In buildings of Class IX all doors which afford ingress or egress from all rooms, except private offices, shall open outward.

ARTICLE XIII.

General Provisions.

725. Construction or Alteration of Building—Requirements.) Every building or structure or part thereof, hereafter constructed, erected, altered, enlarged, repaired or changed within the City shall be so constructed, erected, altered, enlarged, repaired or changed, in accordance with the provisions of this Chapter.

726. Class of Buildings Not to Be changed Without Conforming to Provisions of This

Chapter.) If buildings, the uses of which bring them within any of the classes mentioned in this Chapter, are to be applied to the uses of any other class for which a better system of construction is required by this Chapter, the construction and equipment of such buildings shall first be made to conform to the requirements of this Chapter as specified for their intended use. And it shall be unlawful to use any such building for a new or different purpose from that to which its structure and equipment adapts it under this Chapter, unless a permit for such alterations or use shall have been first obtained from the Commissioner of Buildings and the requirements of this chapter for such new or different use shall have been complied with.

727. Alterations of Existing Buildings.)

(a) In construing the several sections of this Chapter, said sections shall not be construed as requiring alterations in the construction or equipment of buildings or structures in existence at the time of the passage of this Chapter, except where specifically provided, unless such buildings shall not have sufficient or adequate means of egress therefrom or ingress thereto, by reason of insufficient or inadequate stairways or stairways improperly located or insufficient or inadequate elevators or elevator equipment, doors, fire escapes, windows or other means of egress or ingress and except also as required in sections which are herein made retroactive.

(b) Whenever an Inspector of Buildings shall make a report to the Commissioner of Buildings that any such building has inadequate or insufficient means of egress therefrom or ingress thereto, as aforesaid, the Commissioner of Buildings shall notify the owner, agent, or person in possession, charge or control of such building of such fact and direct him forthwith to make such alterations and changes in the construction or equipment of such building as are necessary to be made in order to make such building comply with the requirements of this Chapter.

(c) If, however, it is desired to enlarge, or in any manner materially modify the construction of any existing building, or to make a change in its use or occupation which will transfer it from one class as recognized by this Chapter to another class, then, before such enlargement or structural change or modification of building is made, or before such change in its use or occupation may be made, written notice shall be given to the Commissioner of Buildings of the intention to change the character of the use, and the entire building shall be reconstructed or modified in such manner as to bring the same, when enlarged or altered, or when occupied for its new and different purposes, into compliance with the provisions of this Chapter.

728. Removal of Brick, Stone, Frame or Concrete Buildings.) It shall be unlawful for any person, firm or corporation to move any brick, stone, frame or concrete building from one location to another, unless the same shall be altered or re-constructed so as to conform to the ordinances governing the construction of such building at the time of moving the same and in its new location; provided, however, that whenever a tenement house is moved, the same shall be made to comply with the requirements of Section 677 and Section 679.

729. Live and Dead Loads—Wind Resistance.) (a) The "dead load" shall include all permanent portions of the building, also partitions and permanent fixtures and mechanisms supported by the building. The "live load" shall include all movable loads or weights placed on floors or other parts of buildings.

(b) All buildings shall be designed to resist a horizontal wind pressure of 20 lbs. per square foot for every square foot of exposed surface. In no case shall the overturning moment due to wind pressure exceed seventy-five per cent of the moment of stability of the building due to the dead load only.

(c) The "live" loads to be provided per square foot of floor areas, except stairs, for the classes of buildings except portions of Classes VIII and IX as herein otherwise provided shall be not less than the following:

	Pounds.
Class I.....	100
Class II.....	50
Class III.....	40
Class IV.....	100
Class V.....	100
Class VI.....	40
Class VII.....	100
Class VIII.....	75
Class IX.....	100

(d) Provided, however, that in Class VIII the portions of the building exclusive of the floors in assembly halls, the corridors and the stairs, shall not be required to be constructed to support a live load in excess of 40 pounds per square foot.

(e) The roofs of all buildings shall be designed and constructed in such a manner that they will bear a load in addition to the weight of their structure and covering, of at least twenty-five pounds for each square foot of horizontal surface.

(f) The live loads to be provided for on stairways for buildings of all classes shall not be less than 100 pounds per square foot of treads and landings.

730. Structural Details—Strength Tests—How Made.) (a) All structural details and workmanship shall be in accordance with accepted engineering practice, and subject to the approval of the Commissioner of Buildings.

(b) Floors, joists and beams shall be designed for the full dead and live loads. Floor girders shall be designed for the full dead and not less than eighty-five per cent of the live load.

(c) In buildings of Classes III and VI, except frame buildings, where the distance between enclosing walls or intermediate walls is more than twenty-five feet in the clear, intermediate supports for the joists shall be either brick, or concrete, or iron, or steel columns, beams, trusses, or girders.

Amended February 20, 1911.

(d) If brick walls are used for this purpose, they may, in all cases where the thickness of walls is given, in Section 732, as 16

inches or more, be made four inches less in thickness than the dimensions stated.

(e) Tests shall be made by the owner, upon the demand of the Commissioner of Buildings, on all forms of floor construction involving spans over eight feet. Such tests shall be made to meet the approval of the Commissioner of Buildings, and must show that the construction will sustain a load equal to twice the sum of the live and dead loads, for which it was designed, without any indication of failure. The construction may be considered as part of the test load. Each test load shall remain in place at least twenty-four hours. On arch construction, this test load shall be placed on one-half of the arch, covering the area from the support to the crown of the arch.

731. Walls, Piers and Columns—Dead and Live Loads.) (a) The full live load on roofs of all buildings shall be taken on walls, piers, and columns.

(b) The walls, piers and columns of all buildings shall be designed to carry the full dead loads and not less than the proportion of the live loads given at bottom of page.

(c) The proportion of the live load on walls, piers, and columns on buildings more than seventeen stories in height shall be taken in same ratio given at bottom of this page.

(d) The entire dead load and the percentage of live load on basement columns, piers and walls shall be taken in determining the stress in foundations.

(e) In addition to the entire dead loads, not less than the following proportion of the percentage of live load on the basement columns, piers and walls shall be taken in determining the number of piles for pile foundations and the area of concrete caissons.

Classes I and VII.....	75 per cent.
Classes II, III and VI.....	50 per cent.
Classes IV, V and VIII.....	25 per cent.

In all foundations eccentric loading must be provided for.

732. Requirements for Enclosing Walls—Table of Thickness—Exceptions—Definition of the Length of Wall—Buttresses, Piers or Pilasters—Inserting Columns in Walls—Anchorage of Walls and Floors—Definition and Limits for Height of Stories—Curtain Walls—Interior Walls to Support Fire-proof Floor Construction.) (a) The walls of all buildings, excepting the enclosing walls of frame buildings, shall be of brick, stone or concrete. The walls shall be solid and of solid material and except as otherwise herein provided shall be of the thickness in inches indicated in the table on next page.

Floor.....	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
17.....	85																
16.....	80	85															
15.....	75	80	85														
14.....	70	75	80	85													
13.....	65	70	75	80	85												
12.....	60	65	70	75	80	85											
11.....	55	60	65	70	75	80	85										
10.....	50	55	60	65	70	75	80	85									
9.....	50	50	55	60	65	70	75	80	85								
8.....	50	50	50	55	60	65	70	75	80	85							
7.....	50	50	50	50	55	60	65	70	75	80	85						
6.....	50	50	50	50	50	55	60	65	70	75	80	85					
5.....	50	50	50	50	50	50	55	60	65	70	75	80	85				
4.....	50	50	50	50	50	50	50	55	60	65	70	75	80	85			
3.....	50	50	50	50	50	50	50	50	55	60	65	70	75	80	85		
2.....	50	50	50	50	50	50	50	50	50	55	60	65	70	75	80	85	
1.....	50	50	50	50	50	50	50	50	50	50	55	60	65	70	75	80	85

(b) In Class VIII buildings the thickness of surrounding walls and of all dividing walls carrying loads of floors and roof shall be as indicated in the following table:

	Base- ment. in.	Stories				
		1	2	3	4	5
One story	16	12				
Two stories	16	16	12			
Three stories	16	16	16	12		
Four stories	20	20	16	16	12	
Five stories	24	20	20	16	16	16

(c) In Class VIII buildings, walls around stairs, elevators and air shafts and joist supports shall comply with the requirements of Section 855 of this Chapter.

(d) The basement walls of two-story buildings and the first story walls of three-story buildings in Classes III and VI may be twelve inches in thickness. The first story walls of one-story buildings and the second story walls of two-story buildings in Classes III and VI may be eight inches in thickness, provided that where a pressed brick face is used no wall shall be less than twelve inches in thickness, and an eight-inch brick or solid concrete partition wall may be built in a building of any class, but in no case shall any eight-inch brick wall be more than fourteen feet in height.

(e) The basement walls of two-story buildings in Classes II, III and VI may be 12 inches in thickness.

(f) In buildings of skeleton fireproof construction, the thickness of walls shall be governed by Section 837 of this Chapter.

(g) Walls less than fifty feet in length and walls less than fifty feet between cross walls, may be built four inches less in thickness than the thickness given in the aforesaid table, but no such wall in such build-

ings shall be less than twelve inches in thickness, provided, however, that such walls in buildings of Classes III and VI may be sixty-five feet in length; and further provided, that eight-inch walls may be used in one-story brick buildings and in the second story of two-story brick buildings of said last mentioned classes where said eight-inch walls are not more than fourteen feet in height and are supported by a foundation or wall not less than twelve inches in thickness.

(h) A brick wall not more than twenty-five feet long and forming one side of a brick shaft for stair, elevator or other purposes, need not exceed sixteen inches in thickness, nor its upper fifty feet twelve inches in thickness, provided that in no case shall the load on such brick wall exceed the safe load for brickwork prescribed by this ordinance.

(i) The length of a wall shall be the distance in which the wall extends in a straight line and shall be measured between angles of the masonry or between exterior and cross walls.

(See illustration on this page.)

(j) Where masonry buttresses or piers or pilasters are employed on either or both sides of a wall, then said walls may be reduced in thickness by one-half of the projection or projections of the buttresses or piers or pilasters, but no wall shall be reduced to less than twelve inches in thickness. The reduction in thickness may be made throughout the height of the wall, except that no twelve-inch wall shall be higher than thirty feet and no sixteen-inch wall shall be higher than fifty feet. The stress in the brickwork in any part of such walls shall not exceed the stress per square inch allowed by this chapter on the kind of masonry employed. Buttresses or piers or pilasters shall be at least one-tenth as wide, measured on face of same, as the spacing between the buttresses or pilasters. Twelve-

	Base- ment.	Stories											
		1	2	3	4	5	6	7	8	9	10	11	12
One-story.....	12												
Two-story.....	16	12	12										
Three-story.....	16	16	12	12									
Four-story.....	20	20	16	16	12								
Five-story.....	24	20	20	16	16	16							
Six-story.....	24	20	20	20	16	16	16						
Seven-story.....	24	20	20	20	20	16	16	16					
Eight-story.....	24	24	24	20	20	20	16	16	16				
Nine-story.....	28	24	24	24	20	20	20	16	16	16			
Ten-story.....	28	28	28	24	24	24	20	20	20	16	16		
Eleven-story.....	28	28	28	24	24	24	20	20	20	16	16	16	
Twelve-story.....	32	28	28	28	24	24	24	20	20	20	16	16	16

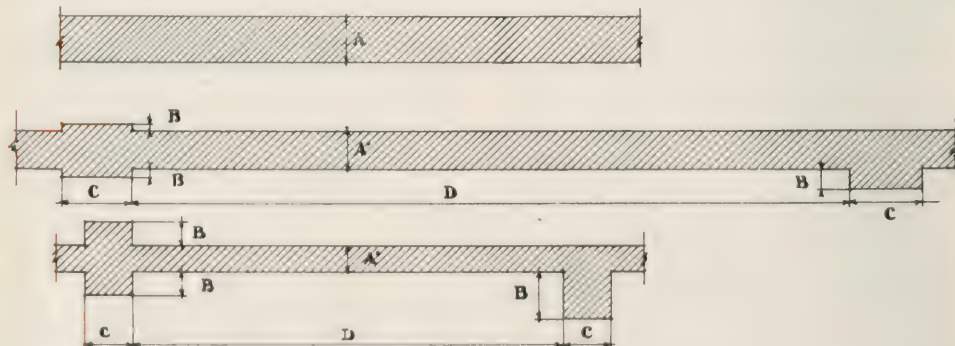


Fig. 17.

THICKNESS OF WALLS. Section 732j.

A = thickness of wall.
A' = thickness of wall after reduction.
B = projection of buttresses, piers or pilasters.
C = width of buttresses, pier or pilasters.

Explanation:
A may be reduced by $\frac{1}{2}$ B as at A'.
C = 1-10 D.

inch walls between buttresses or piers or pilasters shall not be used where the distance between buttresses or piers or pilasters is greater than eighteen feet. Sixteen-inch walls shall not be used between buttresses or piers or pilasters where the distance between buttresses or piers or pilasters is greater than twenty-four feet. Twenty-inch walls shall not be used between buttresses or piers or pilasters where the distance between the buttresses or piers or pilasters is greater than thirty feet.

(k) Where buttresses are used, they shall be so placed that the principal girders and trusses shall bear on them.

(l) If the loads carried by trusses and girders are supported by iron, steel, or reinforced concrete columns, then such buttresses as are herein described shall not be required except for the fireproofing of steel and iron columns. The walls between such columns shall be built as required by this Chapter, and said walls shall be anchored to such columns by metal anchors in every seven feet to the height of such column.

(m) A structural floor system shall extend from one wall to an opposite wall, and the walls shall be anchored to floor joists or girders or both with iron anchors placed opposite one another, secured to the same joists or girders in pairs, every seven feet or less of length of said walls. Where said joists or girders are of such length that it is not practicable to make them of one piece, then the several pieces shall be joined at each splice or joint by the tie plates or tie bars or other metal connections of the same strength as the anchors. Such anchors shall have not less than four-tenths of a square inch of metal in its smallest cross-sectional area. The spikes, bolts or screws, securing said anchors and tie plates, shall be of such number and size as to transmit the tensile strain which the anchor is capable of resisting into the joists or girders to which said anchors are connected. All pin anchors shall extend at least eight inches into the supporting masonry.

(n) The story height of buildings shall be the distance between structural floor systems or between such structural floor systems and structural roof systems and shall be as follows:

Where 12-inch walls are used, the story height shall not exceed 13 feet.

Where 16-inch walls are used, the story height shall not exceed 24 feet.

Where 20-inch walls are used, the story height shall not exceed 30 feet.

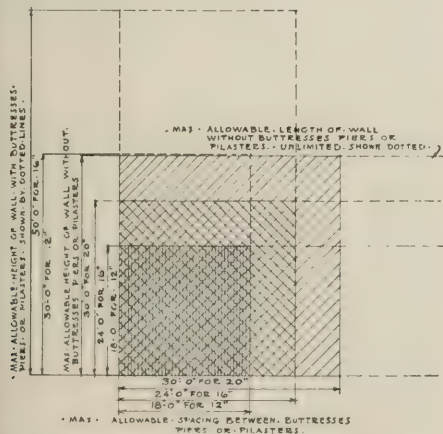


Fig. 18.

Explanatory diagram of maximum allowable height spacing and length of walls with or without buttresses, piers or pilasters.

(o) Where the story height is greater than thirty feet, the walls shall not be of less thickness than the following: The upper fifteen feet shall be not less than sixteen inches in thickness, and the walls shall be increased four inches in thickness at each interval of fifteen feet or fractional part thereof of height.

(p) Curtain walls in skeleton construction buildings may be built of hollow clay tile subject to the requirements and limitations of paragraph (c), Section 779 of this chapter, or may be constructed of reinforced concrete subject to the provisions and limitations of Section 766 of this chapter.

(q) The walls of buildings to be used for the purposes of Classes III and VI and not more than two stories in height may be of hollow clay tile or moulded hollow concrete blocks not thinner than the thickness herein required for brick walls, subject to the approval of the Commissioner of Buildings.

(r) Interior brick walls used to support fireproof floor construction, where brick walls are not required by this chapter, may be built thinner than the thickness required by the provisions of paragraph (a) of this section, in case the proportion between the thickness of such walls and the free height between floors does not exceed fifteen, and provided the unit stresses do not exceed the stresses allowed by this chapter, and provided further, that no such wall shall be constructed of a thickness less than twelve inches.

733. **Ledges—Joist Supports.** (a) In buildings two stories or more in height wherever party walls or partition walls twelve inches or less in thickness are used for the support of wood joists in buildings of Classes I, II, IV, V, VII and VIII the joists shall be supported on ledges of brick formed by corbeling not less than four courses of brick and the upper course shall project four inches beyond the face of the wall, and the joists shall be protected from the bottom to the top of same for the distance of the projection of the corbel by solid brick work laid in mortar.

(b) Wherever iron or steel joist and girder boxes having five complete sides of iron, nowhere less than ¼-inch in thickness, are used, corbels and ledges as herein specified may be omitted.

(c) In buildings of every class where wood furring is used on brick walls, the brick between joists shall be projected from the bottom of the joist to the top of the joist for the full thickness of the furring and in no case shall such projection be less than two inches.

(See illustration on next page.)

734. **Walls of Altered Buildings—Increasing Thickness of.** If the walls of a building are not of sufficient thickness to comply with the requirements of this Chapter for an enlarged or modified building, then the thickness of the existing walls shall be increased by building alongside of them a new wall, which shall not, however, be less in any part thereof than twelve inches thick, and which shall be increased in thickness by four inches for at least every forty feet in the height of such wall. Such new wall shall be laid in Portland cement mortar and shall be anchored to the old wall, but bonding with brick or masonry will not be considered as complying with this Chapter; and if an increase in the height of the building is contemplated, the wall from the top of the old wall shall be built jointly upon the new and old walls. If solid masonry buttresses are introduced in connection with such thickening and strengthening of existing walls, the intervening wall may be reduced to eight inches in thickness, provided such buttresses are sufficient in number and in area to make the resultant structure of equal strength with the solid wall already

specified. Provided, however, that steel or iron columns or beams may be used instead of such new wall, such columns or beams to be bolted or bonded to the existing wall in a manner satisfactory to and approved by the Commissioner of Buildings.

735. Walls—Party.) The provisions of the preceding section shall also apply to all cases where existing party walls are to be joined to for the erection of new buildings. But in the case of party walls, which at the time of their erection were built in

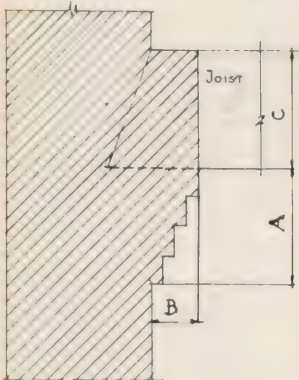


Fig. 19.

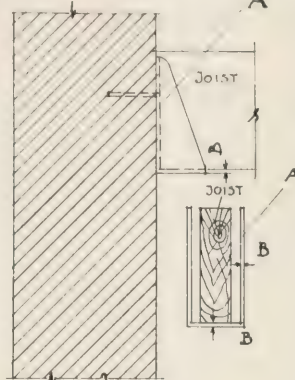


Fig. 20.

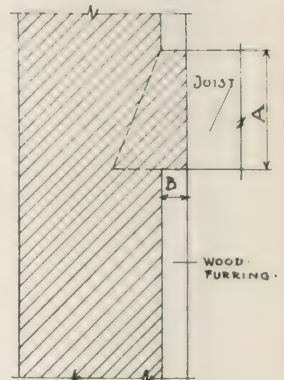


Fig. 21.

LEDGES—JOIST SUPPORTS.

Section 733a, b, c.

Fig. 19 (A) Corbelling to be not less than four courses of brick.
(B) Upper course shall project four inches.
(C) The joists shall be protected from top to bottom by brick.

Fig. 20 (A) Metal joist hanger allowable.
(B) $\frac{1}{4}$ inch metal required.

Fig. 21 (A) Brick shall project between joists
(B) Projection of brick to be two inches.

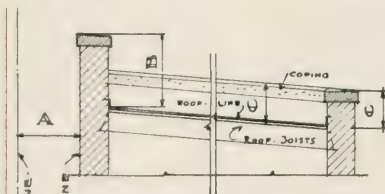


Fig. 22

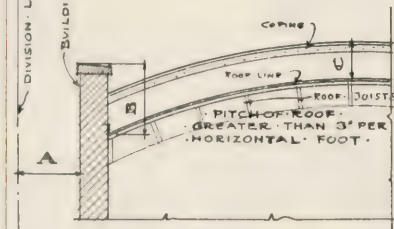


Fig. 23.

Fig. No. 22.

A—distance from division lot line to building line.
B—height of parapet wall above roof on division lot line side.
C—parapet wall on other sides when required.
Explanation:
 If **A** is less than 3'0", **B** shall be 3'0".
 If **C** shall be not less than 18".

SECTION 737 D.

Fig. No. 23.

A—distance from division lot line to building line.
B—height of parapet wall above roof, with a greater pitch than 3° per horizontal foot, on division lot line side.
C—parapet wall on other sides when required.
 If **A** is less than 3'0", **B** shall be 3'0".
 If **C** shall be not less than 18".
 For exceptions where fireproof construction is used see ordinance Sec. 737 d, second paragraph.

accordance with the terms of the city ordinances then in force, such walls, if sound and in good condition, may be used without increase of thickness for any building not higher than and of the same class as the building for which the original wall was built.

736. Walls—Erection of—Walls and Skeleton Framework Securely Braced.) In the erection of buildings of masonry construction, no wall shall be carried up at any time more than two stories above another wall of the same building. The walls and skeleton framework of all buildings shall be kept securely braced and otherwise protected against the effects of the weather during all building operations.

737. Parapet Walls—When Required on Walls and Porches—Thickness and Height of.) (a) On all flat roof buildings parapet walls shall be erected, except as hereinafter provided, on all exterior walls and on all partition walls required by this ordinance by reason of the area of such buildings; provided, that such parapet walls may be dispensed with on any wall of a fireproof building, and on street and alley walls and on yard and court walls of buildings of other types where the entire framing and materials of the roof are strictly fireproof or where all portions of the roof nearer than fifteen feet to the lot line of such street or alley or bounding such yard or court are protected against fire by a continuous covering of porous or hollow tiles, not less than two inches thick and surfaced with mortar, on top of the roof boards.

(b) Such parapet walls may be eight inches thick wherever this ordinance permits the use of eight-inch walls; elsewhere they shall be not less than twelve inches in thickness.

(c) Such parapet walls shall extend at any point not less than three feet vertically above the roof on all such required partition walls and on all other walls within less than three feet of any division lot line and approximately parallel therewith; else-

where they shall extend not less than eighteen inches above the roof.

(d) On all buildings whose roofs have a greater pitch than three inches per horizontal foot, parapet walls, of thickness and height as above specified, shall be erected on required partition walls, on exterior walls approximately parallel with and less than three feet distant from a division lot line, and on walls abutting on another building. Provided, that such parapet walls may be dispensed with where the entire framing and materials of the roof are fire-proof or where the cornice and roof coverings are of incombustible material and the top of the roof boards is protected against fire for at least five feet up from such wall by a coating of plaster on porous or hollow tiles at least two inches thick; and further provided that such parapet walls and such protection against fire may be dispensed with on buildings of Classes III and VI.

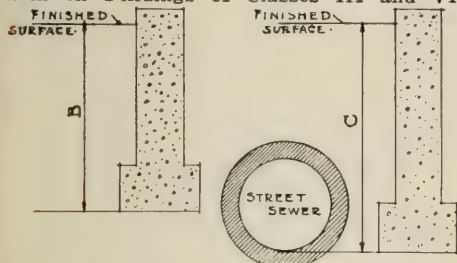


Fig. 24.

FOOTINGS.

Sections 740a, b.

Fig. 25.

Fig. 24 (B) Shall in all cases extend 4' 0" below finished grade at building, unless footings rest on bed rock—Sec. 740a.

Fig. 25 (C) Buildings 100 ft. or more in height; footings shall extend at least to a depth drained by sewer in adjacent streets and alleys.

Exception if sewer is greater than 10 ft. below sidewalk grade. Such foundation need not extend to a greater depth than 10 ft. if soil conditions are as per ordinance—Sec. 740b.

three stories or less in height when such buildings have cornices of incombustible material and roof coverings of slate or terra cotta roofing tile.

738. Allowable Stresses and Special Requirements for Foundations—Bearing on Various Soils.) (a) If the soil is a layer of pure clay at least fifteen feet thick, without admixture of any foreign substance other than gravel, it shall not be loaded to exceed 3,500 pounds per square foot. If the soil is a layer of pure clay at least fifteen feet thick and is dry and thoroughly compressed, it may be loaded not to exceed 4,500 pounds per square foot.

(b) If the soil is a layer of firm sand fifteen feet or more in thickness, and without admixture of clay, loam or other foreign substance, it may be loaded not to exceed 5,000 pounds per square foot.

(c) If the soil is a mixture of clay and sand, it shall not be loaded to exceed 3,000 pounds per square foot.

739. Foundations in Wet Soil—Trenches to Be Drained.) In all cases where foundations are built in wet soil, it shall be unlawful to build the same unless trenches in which the work is being executed are kept free from water by bailing, pumping, or otherwise, until after the completion of work upon the foundations and until all cement has properly set. In all cases a connection with the street sewer shall be established before beginning the work of laying foundations.

740. Foundations—Where not Permitted—Depth Below Surface—Independent of Underground Construction Owned or Controlled by the City.) (a) Foundations

must rest on hard sound soil, and shall not be laid or filled or made ground or on loam, or on any soil containing admixture of organic matter. Foundations shall in all cases extend at least four feet below the finished surface of the ground upon which they are built, unless footings rest on bed rock.

(b) Foundations shall in all cases extend at least four feet below the surface of the ground upon which they are built, and in the case of all buildings 100 feet or more in height, foundations shall extend at least to the depth drained by the street sewer in the adjacent streets or alleys; but if such sewers are at a greater depth than ten feet below the sidewalk grade, such foundations need not extend to a greater depth than ten feet, provided that sound, hard soil is found at that depth.

(c) Every building forty feet or more in height, hereafter erected, which is located adjacent to any street or alley containing any then existing water main, water tunnel, sewer, conduit, tunnel, subway or other underground construction, owned or controlled by the City, shall be so constructed that the foundation or superstructure thereof shall not be supported in whole or in part by any such underground construction.

741. Foundation Construction.) Foundations shall be constructed of stone, gravel or slag concrete, dimension stone or rubble stone, sewer or paving bricks, iron or steel imbedded in concrete or piles, or a combination of any of the same. All masonry foundations shall be laid in cement mortar.

742. Foundation of New and Old Walls.) In all cases where there is an increase in the thickness of walls, a new foundation shall be built in such a manner as to carry jointly both the new and old walls, and the soil under such foundations shall not be loaded beyond the limits specified in this Chapter.

All foundations shall be protected against the effects of frost, and cement mortar which has been affected by frost, shall not be used in building operations.

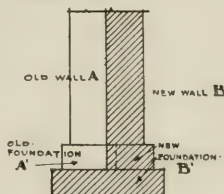


Fig. 26.

SECTION 742.

- A—old or present wall.
- B—new wall.
- A—foundation under old wall.
- B—required new foundation.

743. Foundations—Pile Borings Required—Safe Load Required—Fiber Stress.) (a) Where pile foundations are used, the Commissioner of Buildings may require auger borings of the soil to be made to determine the position of the underlying stratum of hard clay or rock. The heads of the piles shall be protected against splitting while they are being driven. The piles shall be sawed off to a uniform level at least one foot below Chicago datum after being driven, and the heads shall be imbedded in concrete or covered with a grillage so proportioned that in the transmission of the load from the structure to the pile the stresses in the materials shall not exceed that prescribed in this Chapter. The top of timber grillage shall be at least one foot below Chicago datum.

(b) The center of gravity of a pile foundation shall coincide with the center of gravity line of the load or loads which it carries.

(c) No pile of less than six inches diameter at small end shall be used.

(d) The safe load on a pile shall be determined by and shall not exceed the following formula:

$$P = \frac{2wh}{S + \frac{1}{10}} \text{ for steam hammer;}$$

$$P = \frac{2wh}{S + 1} \text{ for drop hammer;}$$

In which formula

S=set in inches.

h=fall in feet.

w=weight of hammer.

P=safe load in pounds.

(e) The maximum load on a timber pile shall not exceed 50,000 pounds.

(f) A wood follower shall not be used in determining the safe load.

(g) Plans for pile foundations shall be submitted to the Commissioner of Buildings for approval and shall specify the least diameter of small end of piles, and no piles with smaller diameter of points than that specified for the job shall be used.

(h) There shall not be less than two rows of piles under all external party walls or other walls less than seventy feet high, and not less than three rows under all walls over seventy feet high, excepting under walls not exceeding fifty feet in height a single staggered row of piles may be used if other conditions of stability are complied with.

(See Special Ruling VII, Page 323.)

744. Concrete Piles Allowable—Compression—Tests—How Made. (a) Where concrete piles are used test piles shall be driven and loaded under the general direction of the Commissioner of Buildings.

(b) The allowable compression of concrete piles shall not exceed 400 pounds per square inch at a section six feet from the surface of the ground in immediate contact with the pile.

(c) These tests shall conform to the following regulations: Tests shall be made on at least two piles in different locations and as directed by the Commissioner of Buildings. Not less than three piles to be driven for each test. The pile to be loaded to be driven first, the second pile to be driven within six hours of the driving of the first, the third pile to be driven within twenty to twenty-four hours after the first. The two latter shall each be driven with centers not to exceed twice the greatest diameter of pile, from the center of the test pile.

(d) The tests shall not be started until at least ten days after the piles to be loaded are driven, except that piles that have been cast and set up before driving may be tested as soon as practicable after driving. The piles shall be loaded with twice the proposed carrying load of the piles.

(e) The settlement shall be measured daily until a period of twenty-four hours shows no settlement.

(f) One-half of the test load shall be allowed for the carrying load, if the test shows no settlement for twenty-four hours and the total settlement has not exceeded one one-hundredths of an inch multiplied by the test load in tons.

745. Steel Rails or Beams in Concrete. If steel or iron rails or beams are used as parts of foundations, they shall be entirely imbedded in concrete extending not less than four inches beyond the metal.

746. Allowable Stresses and Special Requirements for Masonry. (a) Allowable stresses in pounds per square inch on plain concrete and stone masonry shall not exceed the following:

Coursed rubble Portland cement mortar	200
Ordinary rubble Portland cement mortar	100

Coursed rubble lime mortar	120
Ordinary rubble lime mortar	60
First-class granite masonry, Portland cement mortar	600
First-class lime and sandstone masonry, Portland cement mortar	400
Portland cement concrete 1-2-4 mixture, machine mixed	400
Portland cement concrete 1-2-4 mixture, hand mixed	350
Portland cement concrete 1-2½-5 mixture, machine mixed	350
Portland cement concrete 1-2½-5 mixture, hand mixed	300
Portland cement concrete 1-3-6 mixture, machine mixed	300
Portland cement concrete 1-3-6 mixture, hand mixed	250
Natural cement concrete 1-2-5 mixture	150

(See Special Ruling V, Page 323.)

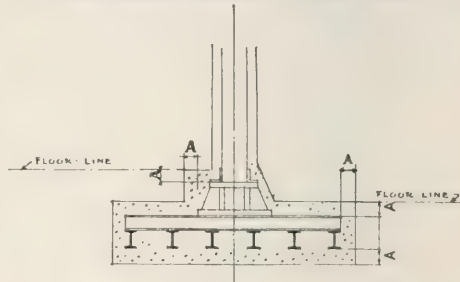


Fig. 27.

Section 745.

(A) Steel and iron rails and beams to be imbedded in concrete, extending not less than 4 inches beyond metal.

(b) Allowable compression in pounds per square inch on brick masonry shall not exceed the following:

	Lbs.
No. 1 paving brick, 1 part Portland cement, 3 parts torpedo sand	350
No. 2 pressed brick and sewer brick, mortar same as referred to above	250
No. 3 hard common select brick, Portland cement mortar, same as referred to above	200
No. 4 hard common select brick, 1 part Portland, 1 lime, 3 sand as referred to above	175
No. 5 common brick, all grades, Portland cement mortar	175
No. 6 common brick, all grades, good lime and cement mortar	125
No. 7 common brick, all grades, natural cement mortar	150
No. 8 common brick, all grades, good lime mortar	100

(c) Brick under Nos. 1 and 2 shall not crush at less than 5,000 pounds pressure per square inch of gross area.

(d) Brick under Nos. 3 and 4 shall not crush at less than 2,300 pounds pressure per square inch of gross area.

(e) Brick under Nos. 5, 6, 7 and 8 shall not crush at less than 1,800 pounds pressure per square inch of gross area. Sand lime brick of this crushing strength may be used where common brick is permitted.

(f) Isolated piers of concrete, brick, or masonry shall not be higher than six times their smallest dimensions unless the above unit of stresses are reduced according to the following formula:

$$P \text{ equals } C \left(1.25 \text{ minus } \frac{H}{20D} \right)$$

In which formula

P is the reduced allowed unit stress.

C is the unit stress in the above table.

H is the height of the pier in feet.

D is the least dimension of the pier in feet

(g) No pier shall exceed in height twelve times the least dimension. Weight of pier shall be added to other loads in computing load coming on the pier.

747. Definition of Terms Used for the Construction of Walls.) (a) Wherever the terms masonry, masonry walls or masonry construction, incombustible wall, fireproof wall or wall of fireproof or incombustible material are used with reference to or in connection with the construction of walls in this chapter, such terms are hereby defined to mean solid walls of brick, stone or concrete, built of solid material, except such walls as are allowed under the provisions of Section 779 of this chapter. Where brick is used in the construction of any wall, the length and thickness of such brick may vary, but each brick must be at least three and seven-eighths inches in width.

(b) Ordinary rubble is hereby defined as masonry composed of unsquared stones laid without attempting any regularity of courses or bond.

Coursed rubble is hereby defined as masonry having approximately level joints; stones to be roughly shaped so as to fit approximately; joints in wall or pier to be leveled off every three (3) feet in height and to be well bonded.

First class masonry is hereby defined as masonry built of stones in regular courses, the bearing surfaces of which as well as ends, to be roughly tooled off and shall be laid with alternate headers and stretchers so as to secure perfect bond.

748. Ashlar Facing.) (a) Ashlar facing of masonry walls shall only be considered as part of wall for the purpose of carrying

weight, when it has a minimum bond as follows:

(b) Every second course to be a bond course, this bond course to extend into the backing a distance equal to the least thickness of ashlar. In addition to such bond, each stone in all courses shall be tied to backing by two galvanized iron anchors. No ashlar shall be less than four inches thick, nor shall the height of any stones exceed five times its thickness.

749. Soft Bricks—Where Not Permitted.) Soft bricks shall not be used in any part of a building where exposed to the weather, nor in external or internal piers of bearing walls.

750. Brickwork—Bonding of.) The bond of all brickwork shall be formed by laying one course of headers for every five courses of stretchers; provided that in the case of pressed brick facing, two headers and a stretcher may be laid alternately in every course or an equivalent number of full headers may be used in any other arrangement approved by the Commissioner of Buildings; and provided further, that pressed brick facing, when not counted as part of the bearing wall, may be laid with fewer or no header courses if anchored to the backing by metal ties of design, material, weight and quantity approved by the Commissioner of Buildings.

751. Bricks—How Laid.) All brick laid up in cement, or lime and cement mortar, shall be thoroughly drenched immediately before being laid unless laid in freezing weather. Both horizontal and vertical joints shall be filled with mortar in all kinds of brick masonry.

752. Allowable Stresses and Special Requirements for Timber.) The maximum allowable stresses in pounds per square inch on actual sections for timber shall be as follows

	Extreme Fibre Stress and Tension with Grain.	Compression with Grain.	Compression Across Grain in Build- ings Hereafter Erected.	Compression Across Grain in Existing Buildings.	Shear with Grain.
Douglas Fir and Long Leaf Yellow Pine....	1,300	1,100	250	400	130
Oak	1,200	900	500	600	200
Short Leaf Yellow Pine.....	1,000	800	250	300	120
Norway Pine	800	700	200	300	80
White Pine	800	700	200	300	80
Hemlock	600	500	150	300	60

The unit stress on timber posts shall comply with the following formula:

$$P = C \left(1 - \frac{L}{80D} \right)$$

In the above formula:

C equals compressive strength of timber with the grain as given in the table.

L equals length in inches.

D equals least diameter inches.

The maximum length of a timber post shall not exceed thirty diameters.

Timber columns shall not be used in buildings of greater height than twice the width of the building nor in buildings over one hundred feet in height.

753. Quality of Timber.) Timber used for building purposes shall be sound, well manufactured, close grained, free from wind shakes, or from dead, loose, decayed, encased or pitch knots, or knots and other defects that will materially impair its strength and durability.

754. Maximum Allowable Stresses and Special Requirements for Metals.) (a) The maximum allowable stresses in pounds per square inch in steel and iron shall not exceed the following:

	Rolled Steel.	Cast Steel.	Wrought Iron.	Cast Iron.
Tension on net section.....	16,000	16,000	12,000	.....
Maximum compression on gross section.....	14,000	14,000	10,000	10,000
Bending on extreme fibre.....	16,000	16,000	12,000	.....
Bending on extreme fibre tension.....	.....	.....	.....	3,000
Bending on extreme fibre compression.....	.....	.....	.....	10,000
Bending on extra fibres of pins.....	25,000	.....	.....	.....
Shear: shop driven rivets and pins.....	12,000	.....	.....	.....
Shear: field driven rivets.....	10,000	.....	.....	.....
Shear on rolled steel shapes.....	12,000	.....	.....	.....
Shear plate girder webs; gross section.....	10,000	.....	.....	.....
Shear on brackets .....	.....	.....	.....	2,000
Bearing, shop driven rivets and pins.....	25,000	.....	.....	.....
Bearing, field rivets	20,000	.....	.....	.....

(b) The allowable compressive stresses per square inch shall be determined by the following formulæ:

Steel	.....	16,000—70—	L
			R
Wrought Iron	.....	12,000—60—	L
			R
Cast Iron	.....	10,000—60—	L
			R

In the above formulæ:

L equals length in inches.

R equals least radius of gyration in inches.

(c) In no case shall the allowable compressive stress exceed that given in paragraph (a) of this section.

(d) For steel columns filled with, and encased in concrete extending at least three inches beyond the outer edge of the steel, where the steel is calculated to carry the entire live and dead load, the allowable stress per square inch shall be determined by the following formula:

$$18,000 - 70 \frac{L}{R}$$

but shall not exceed 16,000 pounds.

(e) For steel columns filled with, but not encased in, concrete the steel shall be calculated to carry the entire live and dead load. In this case the above formula may be used, but the allowable stress shall not exceed 14,000 pounds.

(f) Stresses due to eccentric loading shall be provided for in all compressive members.

(g) The length of rolled steel compressive members shall not exceed one hundred twenty times the least radius of gyration, but the limiting length of struts for wind bracing only may be one hundred fifty times the least radius of gyration. The limiting length for cast iron columns shall be seventy times the least radius of gyration.

(h) Cast iron columns shall not be used in buildings of greater height than twice the least width, or in buildings over 100 feet high.

(See Special Ruling VIII, Page 323.)

755. **Live and Dead Loads—Stress.** (a)

Wherever the live and dead load stresses are of opposite character, only 70 per cent of the dead load stress shall be considered as effective in counteracting the live load stress.

(b) For stresses produced by wind forces combined with those from live and dead load, the unit stress may be increased fifty per cent. over those given above; but the section shall not be less than required if wind forces be neglected.

(See Special Ruling XIII, Page 325.)

756. **Riveting—Tension.** (a) In proportioning tension members the diameter of the rivet holes shall be taken one-eighth of an inch larger than the nominal diameter of the rivet.

(b) In proportioning rivets the nominal diameter of the rivet shall be used.

(c) Pin-connected riveted tension members shall have a net section through the pin-hole at least 25 per cent in excess of the net section of the body of the member and the net section back of the pin-hole, parallel with the axis of the member, shall not be less than the net section of the body of the member.

757. **Plate Girders — Flanges — Compression.** (a) Plate girders shall be proportioned either by the moment of inertia of their net section, or by assuming that the flanges are concentrated at their centers of gravity and a unit stress used such that the extreme fibre stress does not exceed 16,000 pounds per square inch, in which case one-eighth of the gross section of the web, if properly spliced, may be used as flange section.

(b) The gross section of the compression flanges of plate girders shall not be less than the gross section of the tension flanges; nor shall the stress per square inch in the compression flange of any beam or girder of a longer length than 25 times the width exceed.

$$20,000 - 160 \frac{L}{B}$$

In which formula

L equals unsupported distance and

B equals width of flange.

(c) The flanges of plate girders shall be connected to the web with a sufficient number of rivets to transfer the total shear at any point in a distance equal to the effective depth of the girder at that point combined with any load that is applied directly on the flanges.

(d) Webs of plate girders shall be provided with stiffeners over all bearing points, under all points of concentrated loading and elsewhere when required by good engineering practice.

Reinforced Concrete.

(See Special Ruling II and III, Page 315.)

758. **Reinforced Concrete—Definition—Plans.** The term "Reinforced Concrete" is hereby defined as any combination of metal imbedded in concrete to form a structure so that the two materials assist each other to sustain all the stresses imposed. Before a permit to erect any reinforced concrete structure is issued, complete plans and specifications shall be filed with the Commissioner of Buildings, showing all details of the construction, including detail of working joints, the size and position of all reinforced rods, stirrups or other forms of metal, and giving the composition and proportion of the concrete; provided, however, that permission to erect any reinforced concrete structure does not in any manner approve the construction until after tests have been made of the actual construction to the satisfaction of the Commissioner of Buildings.

(See Special Ruling III, Page 315.)

759. **Ratio of Modul of Elasticity—Adhesion—Bond.** (a) The calculations for the strength of reinforced concrete shall be based on the assumed ultimate compressive strength per square inch designated by the letter "U" given in the table below for the mixture to be used.

(b) The ratio designated by the letter "R" of the modulus of elasticity of steel to that of the different grades of concrete shall be taken in accordance with the following table:

Mixture.	U	R
1 cement, 1 sand, 2 broken stone, gravel or slag	2,900	10
1 cement, 1½ sand, 3 broken stone, gravel or slag	2,400	12
1 cement, 2 sand, 4 broken stone, gravel or slag	2,000	15
1 cement, 2½ sand, 5 broken stone, gravel or slag	1,750	18
1 cement, 3 sand, 7 broken stone, gravel or slag	1,500	20

(See Special Ruling II, Page 315.)

760. **Unit Stresses for Steel and Concrete.** (a) The stresses in the concrete and the steel shall not exceed the following limits:

(b) Tensile stress in steel shall not exceed one-third of its elastic limits and shall not exceed 18,000 pounds per square inch.

(c) Shearing stress in steel shall not exceed 12,000 pounds per square inch.

(d) The compressive stress in steel shall not exceed the product of the compressive

stress in the concrete multiplied by the elastic modulus of the steel and divided by the elastic modulus of the concrete.

(e) Direct compression in concrete shall be one-fifth of its ultimate strength. Bending in extreme fibre of concrete shall be thirty-five one-hundredths of the ultimate strength.

(f) Tension in concrete on diagonal plane shall be one-fiftieth of the ultimate compressive strength.

(g) For a concrete composed of one part of cement, two parts of sand and four parts of broken stone, the allowable unit stress for adhesion per square inch of surface of imbedment shall not exceed the following:

	Pounds Per Sq. Inch.
On plain round or square bars of structural steel	70
On plain round or square bars of high carbon steel	50
On plain flat bars, in which the ratio of the sides is not more than 2 to 1....	50
On twisted bars when the twisting is not less than one complete twist in eight diameters	100

(h) For specially formed bars, the allowable unit stress for bond shall not exceed one-fourth of the ultimate bond strength of such bars without appreciable slip which shall be determined by tests made by the person, firm or corporation engaged in such construction work to the satisfaction of the Commissioner of Buildings, but provided that in case shall such allowable unit stress exceed 100 pounds per square inch of the specially formed bars.

761. Design for Slabs, Beams and Girders. Reinforced concrete slabs, beams and girders shall be designed in accordance with the following assumptions and requirements:

(a) The common theory of flexure shall be applied to beams and members resisting bending.

(b) The adhesion between the concrete and the steel shall be sufficient to make the two materials act together.

(c) The steel to take all the direct tensile stresses.

(d) The stress strain curve of concrete in compression is a straight line.

(e) The ratio of the moduli of elasticity of concrete to steel shall be as specified in the table in Section 759.

(See Special Ruling II and IV, Pages 315, 321.)

762. Moments of External Forces. (a) Beams, girders, floor or roof slabs and joists shall be calculated as supported, or with fixed ends, or with partly fixed ends, in accordance with the actual end conditions, the number of spans and the design.

(b) When calculated for ends partly fixed for intermediate spans with an equally distributed load where the adjacent spans are of approximately equal lengths:

Bending moment at center of spans shall not be less than that expressed in the following formula

$$\frac{WL^2}{12} \text{ for intermediate spans}$$

$$\text{and } \frac{WL^2}{10} \text{ for end spans.}$$

(c) The moment over supports shall not be less than the formula

$$\frac{WL^2}{18} \text{ and the sum of the moments over one support and at the center of span shall be taken not less than}$$

$$\text{the formula } \frac{WL^2}{8}$$

In the formulas hereinabove given "W" is the load per lineal foot and "L" the length of span in feet.

(d) In case of concentrated or special loads the calculations shall be based on the critical condition of loading.

(e) For fully supported slabs, the free opening plus the depth, for continuous slabs, the distance between centers of supports, is to be taken as the span.

(f) Where the vertical shear, measured on the section of a beam or girder between the centers of action of the horizontal stresses, exceeds one-fiftieth of the ultimate direct compressive stress per square inch, web reinforcement shall be supplied sufficient to carry the excess. The web reinforcement shall extend from top to bottom of beam, and loop or connect to the horizontal reinforcement. The horizontal reinforcement carrying the direct stresses shall not be considered as web reinforcement.

(g) In no case, however, shall the vertical shear, measured as stated above, exceed one-fiftieth of the ultimate compression strength of the concrete.

(h) For T beams the width of the stem only shall be used in calculating the above shear.

(i) When steel is used in the compression side of beams and girders, the rods shall be tied in accordance with requirements of vertical reinforced columns with stirrups connecting with the tension rods of the beams or girders.

(j) All reinforcing steel shall be accurately located in the forms and secured against displacement; and inspected by the representative of the architect or engineer in charge before any surrounding concrete be put in place. It shall be afterwards completely inclosed by the concrete, and such steel shall nowhere be nearer the surface of the concrete than 1½-inch for columns, 1½ inch for beams and girders, and ½-inch, but not less than the diameter of the bar, for slabs.

(k) The longitudinal steel in beams and girders shall be so disposed that there shall be a thickness of concrete between the separate pieces of steel of not less than one and one-half times the maximum sectional dimension of the steel.

(l) For square slabs with two-way reinforcements the bending moment at the center of the slab shall not be less than that

$$\text{expressed in the formula } \frac{WL^2}{24} \text{ for inter-}$$

$$\text{mediate spans, and } \frac{WL^2}{20} \text{ for end spans.}$$

(m) The moment over supports shall not be less than the formula

$$\frac{WL^2}{36} \text{ and the sum of the moments over one support and at the center of the span shall be taken not less}$$

$$\text{than the formula } \frac{WL^2}{12}$$

In which above formula "W" is the load per lineal foot and "L" the length of the span.

(n) For squares or rectangular slabs, the distribution of the loads in the two directions, shall be inversely as the cubes of the two dimensions.

(o) Exposed metal of any kind will not be considered a factor in the strength of any part of any concrete structure, and the plaster finish applied over the metal shall not be deemed sufficient protection unless applied of sufficient thickness and so secured as to meet the approval of the Commissioner of Buildings.

(p) Shrinkage and thermal stresses shall be provided for by introduction of steel.

(q) In cases which it is claimed that equally good or more desirable system of reinforced concrete not covered by, or varying as to design from the conditions heretofore given, he shall present to the Commissioner of Buildings plans and specifications giving in detail the construction and formulas used in his design, and the same to be such that they can be checked properly and kept on record by this bureau. He shall then make a destruction test or present evidence satisfactory to the Bureau that such test has been made, with full particulars of the result of the test. If said test shows that based on the specifications submitted, the construction has a factor of safety of four on total dead and live load and otherwise meets with the approval of the Commissioner of Buildings, the said system of reinforced concrete may be used in accordance with said plans and specifications.

Passed, April 27, 1925.

(See Special Ruling II, Page 315.)

763. Limiting Width of Flange in "T" Beams. (a) In the calculation of ribs, a portion of the floor slab may be assumed as acting in flexure in combination with the rib. The width of the slab so acting in flexure is to be governed by the shearing resistance between rib and slab, but limited to a width equal to one-third of the span length of the ribs between supports and also limited to a width of three-quarters of the distance from center to center between ribs.

(b) No part of the slab shall be considered as a portion of the rib, unless the slab and rib are cast at the same time.

(c) Where reinforced concrete girders support reinforced concrete beams, the portion of floor slab acting as flange to the girder must be reinforced with rods near the top, at right angles to the girder, to enable it to transmit local loads directly to the girder and not through the beams.

(See Special Ruling IV & XVII, Pages 321, 327.)

764. Reinforced Concrete Columns—Limit of Length—Per Cent of Reinforcement—Bending Moment in Columns—Tying Vertical Rods. (a) Reinforced concrete may be used for columns in which the concrete shall not be leaner than a 1:2:4 mixture and in which the ratio of length to least side or diameter does not exceed twelve, but in no case shall the cross section of the column be less than 64 square inches. Longitudinal reinforcing rods must be tied together to effectively resist outward flexure at intervals of not more than twelve times least diameter of rod and not more than 18 inches. When compression rods are not required, reinforcing rods shall be used, equivalent to not less than one-half of one per cent of the cross sectional area of the column; provided, however, that the total sectional area of the reinforcing steel shall not be less than one square inch, and that no rod or bar be of smaller diameter or smaller least dimensions than one-half inch. The area of reinforcing compression rods shall be limited to three per cent. of cross sectional area of the column. Vertical reinforcing rods shall extend upward or downward into the column, above or below, lapping the reinforcement above or below enough to develop the stress in rod by the allowable unit for adhesion. When beams or girders are made monolithic with or rigidly attached to reinforced concrete columns, the latter shall be designed to resist a bending moment equal to the greatest possible unbalanced moment in the beams or girders at the columns, in addition to the direct loads for which the columns are designed.

(b) When the reinforcement consists of vertical bars and spiral hooping, the con-

crete may be stressed to one-fourth of its ultimate strength as given in Section 759, provided, that the amount of vertical reinforcement be not less than the amount of the spiral reinforcement, nor greater than eight per cent. of the area within the hooping; that the percentage of spiral hooping be not less than one-half of one per cent. nor greater than one and one-half per cent.; that the pitch of the spiral hooping be uniform and not greater than one-tenth of the diameter of the column, nor greater than three inches; that the spiral be secured to the verticals at every intersection in such a manner as to insure the maintaining of its form and position, that the verticals be spaced so that their distance apart, measured on the circumference be not greater than nine inches, nor one-eighth the circumference of the column within the hooping. In such columns, the action of the hooping may be assumed to increase the resistance of the concrete equivalent to two and one-half times the amount of the spiral hooping figured as vertical reinforcement. No part of the concrete outside of the hooping shall be considered as a part of the effective column section.

765. Structural Steel Columns. When the vertical reinforcement consists of a structural steel column of box shape, with lattice or battens of such a form as to permit its being filled with concrete, the concrete may be stressed to one-fourth of its ultimate strength as given in table in Section 759, provided that no shape of less than one square inch section be used and that the spacing of the lacing or battens be not greater than the least width of the columns.

(See Special Ruling X, Page 325.)

766. Curtain Walls in Skeleton Construction Buildings. Buildings having a complete skeleton construction of steel or of reinforced concrete construction, or a combination of both, may have exterior walls of reinforced concrete eight inches thick; provided, however, that such walls shall support only their own weight and that such walls shall have steel reinforcement of not less than three-tenths of one per cent in each direction, vertically and horizontally, the rods spaced not more than twelve-inch centers and wired to each other at each intersection. All bars shall be lapped for a length sufficient to develop their full stress for the allowable unit stress for adhesion. Additional bars shall be set around openings, the verticals wired to the nearest horizontal bars, and the horizontal bars at top and bottom of openings shall be wired to the nearest vertical bars. The steel rods shall be combined with the concrete and placed where the combination will develop the greatest strength, and the rods shall be staggered or placed and secured so as to resist a pressure of thirty pounds per square foot, either from the exterior or from the interior on each and every square foot of each wall panel.

767. Bending and Elongation of Steel. The bending and elongation of steel used in reinforced concrete construction shall conform to the following requirements: (a) Steel having a diameter of three-fourths of an inch or less shall be capable of bending cold ninety degrees over a diameter equal to twice the thickness of the piece without fracture; steel over three-fourths inch in diameter shall be capable of bending cold to ninety degrees over a diameter equal to three times the diameter of the piece.

(b) The material of reinforcement shall be such form that it will not elongate under working stress to exceed one fifteen-hundredths.

(c) Reinforcing steel used in reinforcing concrete construction shall not be painted,

but shall be free from all mill scale and loose rust.

768. Cement Tests.) (a) Only Portland cement shall be used in reinforced concrete construction. All cement shall be tested in car load lots when delivered, or in quantities equal to the same. Cement failing to meet the requirements of accelerated test shall be rejected.

(b) Pats of neat cement must be allowed to harden twenty-four hours in moist air, and then be submitted to the accelerated test as follows: A pat is exposed in any convenient way in an atmosphere of steam, and above boiling water, in a loosely closed vessel for three hours, after which before the pat cools, it is placed in the boiling water for five additional hours. To pass this test satisfactorily, the pat shall remain firm and hard, and show no signs of cracking, distortion or disintegration.

(c) Portland cement when tested shall have a minimum tensile strength as follows: Neat cement after one day in moist air shall develop a tensile strength of at least 200 pounds per square inch; after one day in air and six days in water shall develop a tensile strength of at least 500 pounds per square inch, and after one day in air and twenty-seven days in water, shall develop a tensile strength of at least 600 pounds per square inch. Cement and sand tests composed of one part of cement and three parts of sand shall after one day in air and six days in water, develop a tensile strength of at least 175 pounds per square inch; and after one day in air and twenty-seven days in water, shall develop a tensile strength of at least 240 pounds per square inch.

(d) A certificate that the cement used has been tested and has met the requirements of this section and that the tests have been made in accordance with the standard specifications and tests for Portland cement as adopted by the American Society for Testing Materials, and by the United States Government adopted 1904; revised 1908, 1909, 1917 and 1921—serial designation C9-21, shall be furnished by the architect or engineer in charge to the Commissioner of Buildings.

769. Sand.) The sand to be used for concrete shall be clean, hard, coarse sand, of the grade known as torpedo sand, and free from loam or dirt, not less than 45 per centum shall be returned on a screen of 400 mesh to the square inch.

770. Stone.) The stone to be used in concrete shall be clean crushed hard stone or clean crushed blast furnace slag or gravel of a size to pass through a one-inch square mesh. If limestone or slag is used, it shall be screened to remove all dust; if gravel is used, it shall be thoroughly washed. Stone shall be drenched immediately before using. If slag is used, it shall be of such character that when made into concrete the concrete will develop a crushing strength equal to that specified for stone or gravel concrete.

771. Mixing.) All concrete shall be mixed in a mechanical mixer except when limited quantities are required, or when the conditions of the work make hand mixing preferable; hand mixing to be done only when approved by the Commissioner of Buildings. In all mixing, the separate ingredients shall be measured and shall be thoroughly mixed and must be uniform in color, appearance and consistency before placing.

772. Placing Concrete.) In filling in concrete around reinforcing steel, the concrete must be worked continuously with suitable tools, as it is put in place. Filling the forms completely and puddling afterward will not be permitted. In placing the concrete, the work shall be so laid out that partly set

concrete will not be subjected to shocks from men wheeling or handling material over it.

773. Concrete Placed in Freezing Weather.) When concreting is carried on in freezing weather, the material must be heated, and such provisions made that the concrete can be put in place without freezing. The use of frozen, lumpy sand, or stone depending on hot water used in mixing to thaw it out will not be permitted. All reinforced concrete shall be kept at a temperature above freezing for at least forty-eight hours after being put in place. All forms under concrete placed in freezing weather shall remain until all evidences of frost are absent from the concrete and the natural hardening of the concrete has proceeded to the point of safety.

774. Concrete Placed in Warm Weather.) Concrete laid in warm weather shall be drenched with water twice daily, Sunday included, during the first week after being put in place.

775. Cement Finish.) Cement finish added to the top of slabs, beams, or girders, shall not be calculated in the strength of a member unless laid integrally with the rough concrete. No greater unit stress shall be allowed on such cement finish than on the rough concrete.

(See Special Ruling IV, Page 321.)

(See Special Ruling IX, Page 323.)

(See Special Ruling XV, Page 327.)

776. Fireproof Concrete Construction—Acceptance.) Reinforced concrete construction will be accepted for fireproof buildings if designed as prescribed in this paragraph. The aggregate for such concrete shall be clean, broken stone or clean crushed blast furnace slag, or clean screened gravel, together with clean, coarse sand of the grade known as torpedo sand; stone, slag or gravel shall be of a size to pass through a screen of three-quarter inch square mesh. The minimum thickness of concrete surrounding the reinforcing members of reinforced concrete beams and girders shall be two inches on the bottom, and one and one-half inches on the sides of said beams and girders. The minimum thickness of concrete under slab rods shall be one inch; and all reinforcement in columns shall have a minimum protection of two inches of concrete except as hereinafter provided, if a supplementary metal fabric is placed in the concrete surrounding the reinforcing, simply for holding the concrete, the thickness of concrete under the reinforcing may be reduced by one-half inch, then such fabric shall not be considered as reinforcing metal.

(See Special Ruling IX, Page 323.)

777. Removal of Forms.) In no case shall the props and shores used in reinforced concrete construction be removed from under floors and roofs in less than two weeks, except as is provided herein. Column forms shall not be removed in less than four days. The centering from bottom of slabs and sides of beams and girders may be removed after the concrete has set for one week, if the floor has obtained sufficient hardness to sustain the dead weight of the said floor. No load or weight shall be placed on any portion of the construction until the concrete has fully set and the centers have been removed.

778. Tests.) The contractor for the reinforced concrete construction shall make load tests on any portion of the work within a reasonable time after erection, as may be required by the Commissioner of Buildings. Such tests must be made under the direction of the Commissioner of Buildings in his presence or in the presence of his representative, and must show that the construction will sustain a load twice the sum of the live and dead loads for which it

was designed, without any sign of failure. The construction may be considered as part of the test load. Each test load shall cover two or more panels and shall remain in place at least twenty-four hours. The deflection under the full test load at the expiration of twenty-four hours shall not exceed one eight-hundredth of the span. These tests shall be considered as tests of workmanship only.

779. Reinforced Terra Cotta Hollow Tile.)

(a) The term reinforced hollow tile is hereby defined to mean a system of hollow burned clay tile in combination with reinforced concrete, in which combination the hollow tile may be used to resist compressive and shearing stresses subject to the following provisions:

The provisions relating to reinforced concrete construction shall hold as far as applicable to this system.

All tile to be hard burned terra cotta tile of uniform quality, free from shrinkage cracks, with true beds and having an ultimate compressive strength of not less than 4,000 pounds per square inch of net area of surface tested.

The following stresses and values shall not be exceeded: Extreme fibre stress (compressive) on hollow tile, 500 pounds per square inch.

Shearing stress on hollow tile, forty pounds per square inch.

Adhesion between tile and 1:2:4 concrete or 1:3 cement mortar, twenty pounds per square inch.

Ratio of modulus of elasticity of steel to that of tile with cement mortar joints, 10.

(b) The hollow tile shall be thoroughly soaked with water at the time concrete is poured and be kept drenched for at least thirty-six hours afterwards. The joints between tiles shall be staggered, buttered and slushed full of mortar consisting of one (1) part of Portland cement and three (3) parts of clean, sharp sand, thoroughly mixed.

(c) Columns of solid terra cotta or of hollow terra cotta in which the sectional area of the open holes in each block shall not exceed twenty (20) per cent of the gross sectional area of such block, may be used for structural purposes provided the height of such column shall not exceed twelve times the least dimension.

The allowable stress shall not exceed 350 pounds per square inch and shall be subject to the reduction formula given in Section 746 in paragraph f.

All terra cotta tile used for construction of columns shall be hard burned terra cotta tile of uniform quality, free from shrinkage cracks, with true beds and having ultimate compressive strength of not less than 6,000 pounds per square inch of net area of cross section of samples tested.

Mortar used in setting terra cotta tile walls and columns to be composed of one (1) part Portland cement and three (3) parts clean, sharp sand, thoroughly mixed.

(d) All terra cotta tile must be thoroughly wet before using and when used in columns must be set on end with the voids running vertically and directly over each other, and with the webs in direct line of pressure.

All vertical joints must stagger and terra cotta blocks must be of proper dimensions to meet this condition as no broken tile will be allowed.

All work to be set plumb, with uniform horizontal joints, thickness to average three-eighths (3/8) of an inch. The minimum time which shall elapse between the finishing of the work and before any load is placed thereon shall be not less than seven days.

(e) Hollow tile may be used for building primary bearing walls, which are defined as walls that may be used to receive directly

the loads from floors or roofs in addition to their acting as partition walls, provided the proportion between thickness of wall and free height between the floors does not exceed fifteen (15) and the load including the weight of the construction does not exceed three hundred and fifty (350) pounds per square inch of net sectional area of tile, and shall be of the thickness specified by this chapter for brick walls. Hollow terra cotta tile may be used for exterior walls, but when so used the thickness and height of the work must conform to the dimensions required for brick walls in this chapter, but must in no case exceed four stories in height in any building. The thickness of walls shall be calculated as the outside dimensions of the tile and each tile shall be full thickness of wall. The thickness of the plastering is not to be included as a part of the thickness of the wall. Walls having a thickness of 4 inches may be used when the height does not exceed five (5) feet. The quality and gross sectional area of the tile and mortar and special provisions as to workmanship as specified for terra cotta columns shall apply to terra cotta tile walls.

(f) Fireproof storage bin, grain elevators and grain warehouses may be built in cylindrical form with terra cotta tile of such height, diameter and thickness as is allowed by safe engineering practices, provided that the material shall not be stressed in excess of the limits prescribed in this chapter for walls and columns.

(See Special Ruling XI, Page 325.)

780. Cinder Concrete. (a) Cinder concrete construction may be used for all buildings in which fire-proof construction is mandatory by this chapter, or where ordinary construction, mill construction or slow-burning construction may be used.

(b) Only clean, thoroughly burnt, steam boiler cinders, free from matter other than cinders may be used. The cinders used shall be of such size that they will pass through a one-inch square mesh. Cinder concrete piers or walls shall not be permitted to carry loads and shall not be given credit therefor.

(c) The ultimate compressive strength per square inch of cinder concrete shall be taken as not exceeding seven hundred pounds. The ratio of the modulus of elasticity of steel divided by the modulus of elasticity of cinder concrete shall be taken as thirty.

(d) There shall not be less than one part of Portland cement to seven parts of cinders and sand of the grade known as torpedo sand in cinder concrete. All other special requirements and methods of calculation for reinforced concrete as required in this chapter shall modify and regulate the use of cinder concrete in buildings.

(e) All steel and all metal pipe and conduits enclosed in cinder concrete shall be protected by a coating of cement grout or plastered with good lime mortar before the cinder concrete is placed.

(f) For fireproof construction, the minimum thickness of cinder concrete covering on structural metal shall be the same as required for brick or concrete covering for fireproof buildings by this chapter. In slow-burning or mill construction buildings, the minimum thickness of cinder concrete covering on structural metal shall be three inches on columns and two inches on beams, girders and other structural steel or iron members.

(g) Wherever cinder concrete is used for the covering of columns, beams, girders or other structural steel members of a building the cinder concrete covering shall have metal binders, or wire fabric, imbedded in and around said columns, beams, girders or other structural steel members. If wire is

used for said metal binders, it shall not be smaller than No. 8 gauge wire and shall be spaced not less than sixteen inches apart along the length of the steel member covered.

(h) Where cinder concrete construction is used for a building which, by this chapter, is required to be of fireproof construction, all parts that carry weights or resist strains, shall be made entirely of incombustible material, and all metallic structural members shall be protected against the effects of fire by cinder concrete proportioned, mixed, applied and secured as herein described.

(i) All other parts of a building of cinder concrete construction, built where fireproof construction is mandatory by this chapter, shall be built and made of the material required by this chapter for buildings of fireproof construction; provided, however, that cinder concrete as described herein, and of the same thickness elsewhere specified, may be used for all protective covering of structural metal, after such metal has been protected by a coating of cement grout or plastered with good lime mortar, as required by this chapter.

(Section 780, Sub-Paragraph II.)

Cinder Concrete Building Unit. (a) A cinder concrete building unit shall be defined to be a building unit composed of selected and graded screened cinder aggregate, which when mixed with other determined proportions of cinder aggregate of different selected size and with cement and water of determined proportions and which building unit during manufacture is immersed in a bath and which unit after curing will give a crushing test of not less than 1,800 pounds per gross square inch area for all solid load-bearing units and a crushing test of not less than 700 pounds per gross square inch area for all hollow units in load-bearing walls and not less than 450 pounds per gross square inch area for all non-load bearing walls and which building units shall maintain a uniform crushing test per 1,000 blocks within a range of twenty per cent all to be above the minimum prescribed above, which said building unit shall have its acidity neutralized and be freed from sulphur to one per cent of the mass.

(b) Said cinder concrete building units will be accepted in masonry, masonry walls or masonry construction, incombustible walls, fireproof walls or walls of fireproof or incombustible material, sound deadening walls, or in exterior walls or partitions and curtain walls or as back-up units in walls, or as facings for pillars, pilasters or buttresses and for floors, or in primary bearing walls, or load bearing walls, where such primary or load-bearing walls are used to receive directly the loads from floors and roofs in addition to their normal function, provided that in the case of primary bearing or load-bearing walls the proportion between the thickness of wall and free height between floors does not exceed fifteen (15) feet, and the load, including construction load, does not exceed the stresses provided for, and shall conform to the thickness prescribed for number four common selected brick in wall.

(c) Cinder concrete buildings units of the usual or accepted type of hollow building units may be used in basement walls, enclosure walls, partition walls, curtain walls or self-supporting walls, or as back-up units, or in fireproof or incombustible walls, or sound deadening walls, and in any other construction where hollow building units of other type are permitted, provided, when used as a part of a wall greater in width than the unit used, or when used as a back-up unit the wall shall be bonded together in courses not farther apart than sixteen inches, and

the bond shall extend into the bonded wall not less than four inches, or a bond as provided in Section 750 of this Code may be used. In laying the bonded wall in other than the regular bond above equivalents for bonding may be used subject to the approval of the Commission. Header blocks may be used in making such bond.

(d) When said cinder concrete building units are used in places where they will come in contact with the earth they shall be protected by a water-proofing material to be approved by the Building Commissioner.

¹ Passed March 30, 1929.

780A. (a) Wherever in this Chapter XVII exterior walls, bearing walls, enclosure walls or piers are, at the option and choice of the person, firm or corporation constructing or causing to be constructed any building authorized to be constructed of brick, or stone, or concrete, or a combination of said materials it shall hereafter be lawful to construct said exterior walls, bearing walls, enclosure walls or piers of brick, or stone, or hollow clay building tile, or concrete, or of any combination of two or more of said materials subject to the following conditions and requirements.

(b) Wherever under authority of this section or of any other section or provision in this Chapter XVII contained hollow clay building tile, or any combination of hollow clay building tile and brick or stone or concrete or two or more of said materials is used in the construction of any such exterior walls, bearing walls, enclosure wall or piers, all such hollow clay building tile and all tile work of masonry in which hollow clay building tile is used shall be subject to the following conditions and requirements:

Height and Thickness of Walls.) The minimum allowable thickness of walls shall be the same as required for brick walls, when used under the same conditions. The walls of one-story one-family residences and the second-story walls of two-family residences may be eight (8) inches thick for the uppermost fifteen (15) feet, provided, however, that when gable construction is used an additional five (5) feet is permitted to the peak of the gable.

The height of tile self-supporting walls shall, in no case exceed forty (40) feet. All heights shall be measured from the top of the basement wall. Walls of hollow clay tile shall be supported at right angles to the wall face at intervals, not exceeding sixteen (16) times the wall thickness, by substantial piers, buttresses, pilasters, cross walls, or returns, at least two (2) feet deep when the limiting distance is horizontal, or by floors when the limiting distance is vertical. In buildings where the walls are supported by the framework at the floor lines, hollow tile or combinations of hollow tile with brick, stone or other masonry, giving wall thicknesses of not less than twelve (12) inches, may be used for the enclosure walls of buildings of any height.

Faced walls shall not be less thickness than is required for masonry walls of the type which forms the backing. Where bonded as provided for herein, the facing may be considered a part of the wall thickness. Brick or masonry facing shall be not less than three and three-quarters (3¾) inches thick.

Parapet and Basement Walls.) Parapet walls shall not be constructed of hollow clay tile on the inside faces of walls extending above the roof line. Basement walls shall not be built of hollow clay tile. Hollow tile shall not be used where it will come in contact with the earth; nor shall it be used below a plane six feet above the grade line.

Cornices.) The center of gravity of stone cornices shall be inside of the outer face of the wall. Terra cotta or metal cornices shall

be structurally supported from the roof of the building.

Bond.) Where two or more hollow units are used to make up the thickness of a wall, the inner and outer courses shall be bonded at vertical intervals not exceeding three courses (or not exceeding 16 inches) by lapping at least one cell completely over a cell in the unit below.

Brick Facing.) Brick facing shall be bonded to walls of hollow tile with at least one full header course in every six courses.

Stone Ashler Facing shall have at least 20% of the superficial area not less than 3½ inches thicker than the remainder of the facing to form bond stones which shall be uniformly distributed throughout the wall. When some stones in every alternate course are at least 7½ inches thick, bonded into the backing at least 3½ inches and at least 20 per cent of the superficial area of the wall is constituted of such bond stone uniformly distributed, the ashler facing may be counted as part of the wall thickness. Every stone not a bond stone and every projecting stone shall be securely anchored to the backing with substantial non-corrodible metal anchors.

Working Stresses.) The maximum allowable compressive stresses on faced walls due to combined live and dead loads shall not exceed the stresses prescribed herein. Where bonded to the backing as above provided for, the facing may be considered in computing the bearing strength.

Mortar.) No lime mortar shall be used in connection with hollow clay tile.

Portland cement mortar shall consist of one part Portland cement and three parts sand and an allowable addition of not to exceed 10 per cent of hydrated lime.

Cement lime mortar shall be composed of two parts Portland cement, one part hydrated lime and not more than four parts clean sand.

Natural cement mortar shall consist of one part natural cement, and not more than three parts clean sand.

All materials for mortar shall be measured by volume.

Piers.) Piers less than twenty-four (24) inches in length measured horizontally between the window frames shall be built up solid for the full story height except in skeleton construction where solid masonry is required for the height of the pier only.

Hollow tile for the purposes herein mentioned shall be subject to the following requirements:

Strength.) The ultimate compressive strength of hollow clay building tile for use in exterior walls, bearing walls, enclosure wall and piers when laid with the cells horizontal shall be not less than eight hundred (800) pounds per square inch of gross sectional areas for individual minimum. At least five representative specimens of tile shall be tested in the position they would occupy when laid in the wall.

The average ultimate compressive strength of hollow tile for exterior and bearing walls when laid in the wall with the cells vertical shall be not less than 1,400 pounds per square inch of gross sectional area. Five representative specimens shall be used for the test and they shall be tested in that position, and the individual minimum shall be not less than 1,000 pounds per square inch of gross sectional area.

The tile shall have the following minimum requirements determined as hereinafter specified:

Weight.) The average unit weight of hollow clay building tile used for exterior walls, bearing walls, enclosure walls and piers shall

be not less than as follows, allowing a toleration of five per cent (5%).

Size	No. of Cells	Weight
4x5x12	1 or 2	9 pounds
8x5x12	3	16 pounds

Tile irregular in shape or tile other than listed herein may be used providing that the webs and shells shall have a minimum thickness of not less than one (1) inch measured inside the scoring and that the minimum thickness of any web or shell shall be not less than one-quarter of the clear length between cross webs, or shells, measured on its longest side; and further provided that any hollow clay tile with a height greater than six (6) inches shall have not less than six cells and the webs and shells shall have a minimum thickness of one (1) inch measured inside the scoring.

Absorption.) The absorption of hollow clay tile for the purposes herein provided shall not exceed sixteen (16%) per cent of the dry weight of the tile based on a five-hour boiling test in accordance with the recommendations of the American Society for Testing Materials (or the five-hour boiling test Bureau of Standards).

Unit Stresses.) The thickness of the walls of materials and types herein permitted shall be sufficient at all points so that the stresses due to combined live and dead loads for which the building is designed shall not exceed eighty (80) pounds per square inch of gross sectional area.

All tile herein provided for shall bear the words "Load Bearing" and the initials or trade mark of the manufacturer. These marks shall be indented on the exterior of the tile and shall be plainly legible.

Concentrated Loads.) Beams, joists, or other concentrated loads, shall be carried on at least two courses of brick, or by steel bearing plates, or by five inches of solid concrete, extending at least eight (8) inches into the wall, and so designed that the stresses herein permitted shall not be exceeded. The space between joists shall be filled with solid masonry.

Chases.) No tile work shall be cut into for pipes nor conduits but chases may be built into the wall providing that the back of the chase shall be at least six (6) inches thick, or the chase may be built of solid masonry.

Skeleton Construction.

(See Special Ruling I, Page 315.)

781. Skeleton Construction.) (a) The term "Skeleton Construction" shall apply to all buildings wherein all external and internal loads and stresses are transmitted from the top of the building to the foundations by a skeleton or framework of metal or reinforced concrete.

(b) In metal frame skeleton construction the beams and girders shall be riveted to each other at their respective junction points. If columns made of rolled iron or steel are used, their different parts shall be riveted to each other, and the beams and girders shall have riveted connections to unite them with the columns. If cast iron columns are used, each successive column shall be bolted to the one below it by at least four bolts not less than ¾ inch in diameter, and the beams and girders shall be bolted to the columns. Bolt holes in flanges for connection from column to column shall be drilled. At each line of floor or roof beams, lateral connections between the ends of the beams and girders shall be made in such manner as to rigidly connect the beams and girders with each other in the direction of their length.

(c) All steel trusses shall be riveted and the steel work in buildings more than 100 feet high and in a building whose height exceeds twice its width shall be riveted.

(d) Wherever it is found impossible to rivet connections as herein described and such connections are bolted, cold rolled or turned bolts of exact fit and diameter in reamed holes may be used in place of rivets with the same allowable stresses as field driven rivets.

(e) All structural members which are temporarily bolted together shall be well bolted in every alternate hole.

(f) After the bases or base plates and columns have been set in place, both shall be protected by a covering of cement concrete applied direct to the metal, measuring not less than two and one-half inches thick from the extreme projection of the metal, filled solid into all spaces, and forming a continuous concrete mass from the grillage or other foundations to an elevation six feet above the floor level nearest the column base plate or column stool.

(g) All metal shall be clean and shall be free from loose rust and scale, and all metal except that to be embedded in concrete shall be protected with at least two coats of metal protecting paint.

(h) All structural details and workmanship shall be in accordance with accepted engineering practice.

(i) All trusses shall be held rigidly in position, both temporarily and permanently by efficient lateral and sway bracing.

Miscellaneous Provisions.

782. Porches—Verandas—Porticos—Construction of Inside Fire Limits. (a) The enclosing walls of porches, verandas, or porticos shall be of incombustible material on buildings inside the fire limits, except that where such porches, verandas, or porticos constitute part of a storm house or of a storm door enclosure, they may be of combustible material, provided, that they be not more than twelve feet high, nor occupy a greater frontage than two feet more than the width of the inner doors protected by such storm enclosure.

(b) On buildings more than three stories in height, porches hereafter erected, if of combustible material, shall not exceed one story in height. Where porches of incombustible material are continuous and extend fifty feet or more across the rear of buildings, there shall be a partition of incombustible material separating each fifty feet of porch from the adjacent porch.

(See Special Ruling XII, Page 325.)

783. Tanks on Roofs—Permits—Fees. It shall be unlawful for any person, firm or corporation to construct, maintain or allow, or permit to remain in or upon the roof of any building in the city, any tank of a larger capacity than four hundred gallons, unless such tank shall rest upon a good and sufficient foundation of solid brick or stone masonry, or upon iron girders set on steel plates which rest upon a good and sufficient foundation of solid brick or stone masonry, or upon iron or steel construction. No tank of a capacity exceeding four hundred gallons shall be constructed in or upon any building without first submitting for the approval of the Commissioner of Buildings a complete set of plans, showing the construction in detail of the supports and foundations of such tank. If such plans shall be satisfactory to the Commissioner of Buildings, they shall be approved by him. The owner or his agent or the contractor erecting such tank shall, before proceeding with the erection of such tank, procure from the Department of Buildings a permit for the sub-structure work, for which permit a fee of five dollars shall be charged.

784. Door and Window Openings, When Protected in Buildings of Classes I, II, IV, V, VII and VIII—Iron Doors—Wired Glass Set in Metal Frames.)

(See Illustration, Sec. 470b).

(a) Where the distance from door to window openings in buildings of Classes I, II, IV, V, VII and VIII is less than thirty (30) feet from the opposite side of the established alley line and where the windows and doors of two or more areas of the same building which is required to be separated by dividing walls by this chapter, are on a court, every such window and door, distant less than thirty feet from another window or door of another such area and also where the doors and window openings are within fifteen (15) feet of an inside lot line, such openings shall be provided with windows and doors constructed of wire glass set in metal frames and sash; provided, further, that doors may be automatic rolling steel shutters or steel plate doors or metal-clad wood doors, and further provided that at least one of the first or ground floor doors must be a swinging door.

(b) Where iron doors are used to fulfill the requirements of this section they shall be made of sheet iron or steel, of not less than No. 14 U. S. gauge metal, and shall lap the wall at least one-half inch all around the opening, and the bottom shall fit the sill closely where it is not practicable to lap it. The frames and crossbars shall be made of one and one-half by one and one-half by one-fourth inch angles and in no case shall there be less than two crossbars, and where the doors are over six feet high, such crossbars shall be placed not more than two feet apart. Lever bars shall be made of one and one-half by three-eighths inch iron, extending at least one-third of the distance across the opposite leaf. The number and spacing of such lever bars shall be the same as the crossbars. Where hinges are used they shall be made of two by one-fourth inch iron, extending at least three-fourths of the way across the door. The number and spacing of such hinges shall be the same as is required for the crossbars. Pin bolt or eyes shall be one-half inch round and shall be securely fastened to the building.

(c) Where metal frames, metal sash and wired glass are used to fulfill the requirements of this section, the glazed portion of the frames and sash shall be set with fire-resisting glass such as is elsewhere herein defined. The glass must be supported by frames and sash and shall be retained by the structural part of the frame or sash independently of the material used for waterproofing purposes. Non-inflammable material only shall be employed for the structural members used for retaining glass in the sash. Frames and sash shall be made of sheet metal or of rolled steel sections. Frames shall be of such form as to be retained in the wall opening either with flanges of at least one and one-half inches in width or by fixed anchors of proper length spaced not exceeding twenty-four inches securely set into the wall. Sheet metal frames and sash shall be made of galvanized iron of not less than No. 24 gauge and of a quality soft enough to permit of necessary bending without breaking, or of not less than 20-ounce copper, or other metal of equal strength and durability and which will not melt at a lower temperature than copper. All joints shall be made with interlocking seams, securely riveted together, and in no case shall solder be used for other than weather-proofing purposes. The head of the frame shall be closed at the top and the piece forming this closure shall be securely fastened to each side at all points. The sill shall be filled with concrete or other incombustible material. Movable or sliding sheet metal sash shall have stiles and rails of thickness and of width at least one and three-quarter inches respectively, and shall be securely fastened together at each corner and so constructed that they will correspond with the construction of the frames at every place of contact. Where frames are made

of solid rolled steel sections the metal shall be not less than one-eighth inch in thickness securely riveted or locked together at all corners and junctions so as to possess sufficient strength and rigidity to withstand shipment, handling and installation without distortion. Where sashes are made of solid rolled steel sections the metal shall not be less than one-eighth inch in thickness excepting the removable members for retaining the glass and the weathering strips which shall not be less than one-sixteenth inch in thickness. The sash members shall be securely riveted or locked together at all corners and junctions so as to possess sufficient strength and rigidity to safely withstand the stresses occasioned by handling, installation, operation and by wind pressure. Frames and sash in the construction of which solid rolled steel section members are used shall have all their parts protected from the effects of rust and corrosion by a covering of durable enamel or by the application of two coats of approved mineral paint. All glazing of frames or sash shall be with wired glass at least one-quarter inch in thickness. The exposed area of any single pane or light of glass measured on the inner side of the window shall not exceed seven hundred and twenty (720) square inches nor shall the width or length of any pane or light of glass exceed forty-eight (48) inches. Glass shall be held in position by a metal ledge on each side of same. Ledges on the back or inner side of the glass shall be at least three-quarter inches high for lights where the unsupported glass area is seven hundred and twenty (720) square inches and for glass of an unsupported area of less than seven hundred and twenty (720) square inches a reduction in height of the inside ledges may be made at the rate of one-sixteenth inch for each one hundred (100) square inches reduction of unsupported glass area, but in no case shall the height of the inside ledges be less than one-half inch. The ledges on the outer or weather side of the glass shall not be less than one-half inch in height for unsupported glass areas in excess of three hundred and fifty (350) square inches. For unsupported glass areas less than three hundred and fifty (350) square inches, the weather side ledge may be one-half the height of the inside ledge but in no case shall it be less than one-quarter inch high. Clearance between the edge of the glass and the bottom of the groove formed by the ledges shall not exceed one-eighth inch and all glass shall be set in suitable putty. Movable sash shall have stiles and rails so constructed that they will properly engage with the frame members at all points of contact, afford ample weatherproof qualities and not warp or bulge materially under heat or rapid cooling.

(d) Lifting or sliding sash shall be counter-weighted so as to balance and if doubling the sash weights shall be separated by parting strips in the weight boxes and the weights shall be accessible through the boxes. Such sash shall be provided with metallic sash chain, cord or tape, and smooth running sash pulleys securely riveted or bolted in place. The sash chain, cord or tape shall be of sufficient strength to withstand severe heat without parting and be thoroughly protected against moisture or corrosion. Sash shall be fitted into frame with suitable stops and parting beads of metal or their equivalent. Sash shall be removable. Meeting rails of the sashes shall be so constructed as to prevent the passage of heat and flame and shall be equipped with one or more substantial sash locks securely riveted or bolted in place.

(e) Horizontally pivoted sash and movable sash shall be provided with steel pivots at least three-eighths inches in diameter securely attached above the middle. Pivots shall work in substantial iron or steel eye plates bushed with brass and securely at-

tached in place. Sheet metal frames shall be reinforced where the pivots enter by riveting on one-eighth inch iron strips so drilled as to receive the pivots. Such sash must be provided with suitable stops and an effective attachment for holding them open or closed and with such substantial gravity locks or ledges that will be positive in action and hold the sashes tightly closed when exposed to heat. Where either sash is stationary or where two pivoted sashes are used the transom bar dividing such sash shall be so constructed that it will not warp or bulge materially under heat or rapid cooling. Rails or transom bars where used shall be made so as not to be easily affected by rust and to afford ample weatherproof qualities.

(f) Vertically pivoted sash shall comply generally with the requirements for horizontally pivoted sash and movable sash. They must be constructed in such a manner as to afford proper stiffness and so as to prevent material warping or bulging under heat or rapid cooling.

(g) Hinged sash or casement windows must be hinged with substantial iron or steel hinges securely bolted or riveted in place, and provided with substantial iron or steel latches or locks securely fastened in place. Such sash shall be constructed so as to fit the frame closely and afford ample weatherproof qualities at all points. It shall be provided with stops and fastenings that will prevent material warping or bulging under heat or rapid cooling.

(h) Where the area of wall openings is in excess of 5 feet by 9 feet, the metal frames containing the sash or glass must be reinforced at every point of division by not less than five-inch "I" beams securely fastened into the brickwork, proper allowance being made for expansion of the beams when heated. "I" beams shall be protected on the flanges with at least two inches of tile, concrete, or other material approved by the Commissioner of Buildings, and next to the web with at least two and one-half inches of such material, which thickness shall be increased on large beams. Metal frames shall be securely attached to the reinforcing members.

(i) Electro-glazed prism glass may be used in lieu of wired glass, when approved by the Commissioner of Buildings as to material and construction of same, providing the frames and sash of same comply with the requirements of this section for wired glass window frames and sash.

(j) In cases in which it is claimed that equally good or more desirable mode or manner of constructing and installing metal frames, metal sash and fire-resisting glass, other than specified in this chapter, can be used in the erection or alteration of buildings, the Commissioner of Buildings upon written application to him for a permit to use the same, shall cause a test to be made of such construction in a laboratory of recognized standing, and may appoint an architect or a fire prevention engineer to represent the City at such test. A requirement of testing said frame and sash shall be that it will be capable of withstanding exposure to fire on the weather side for one hour with temperatures rising gradually to at least fifteen hundred (1500) degrees Fahr. without loss of glass or material passage of flame, and immediately after exposure to such before-described fire conditions it shall be required to withstand application to the weather side of a stream of water at least seven-eighths inches in diameter applied from a distance of twenty feet at sixty (60) pounds pressure. The results of the test shall show also that the proposed material and construction will be equal or better in fire-resisting and structural qualities to a frame and sash of dimensions not greater than five feet by nine feet built as per re-

quirements of this section. All expenses of this test shall be borne entirely by the applicant for such permit. In the event of such examination and test being satisfactory to the Commissioner of Buildings he shall authorize the use of such frames and sash as a compliance with this section.

(k) This section shall not apply to frame buildings nor to buildings outside the fire limits twenty-eight hundred square feet or less in area, nor to buildings of Class I, one story in height, nor to buildings of Class II not more than two stories in height, nor to store windows in the first story, where the same are located on an alley and not more than sixteen feet from the street.

785. Window and Door Sills—Columns and Lintels Supporting Store Fronts—Incombustible.) (a) For buildings other than frame buildings window and door sills shall be made of incombustible material. Oak timber used for door sills and not less than eight inches thick by the full width of the wall in which such sills occur, shall, for the purpose of this Chapter, be counted incombustible.

(b) In buildings other than frame and excepting buildings of Classes III and VI, lintels shall be of incombustible material; provided that in one-story store front buildings columns and lintels may be of combustible material.

786. Courts and Light Shafts in Buildings.) (a) Every court or light shaft of every building shall be open and unobstructed from the bottom of such court to the sky, with the exception that fire escapes may be built therein, and such courts shall have walls constructed in the same manner as is required for the exterior walls of such buildings; provided, that no walls inclosing such courts are required on street or alley lot lines.

(b) All windows, doors or other openings in court walls, except as otherwise provided in this Chapter, shall have metal frames, metal sashes and metal doors, with the glazed portions thereof of wired glass.

787. Bay Windows—Light Courts—Shafts—Construction of.) (a) The walls of every bay window and every court in every masonry constructed building, except buildings of Class III, shall be built of brick or other fireproof construction throughout as required for exterior walls.

(b) The walls of every vent shaft of every masonry constructed building, except buildings of Class III, shall be built of masonry or a fireproof material not less than four inches in thickness supported by steel or iron.

(c) Every court, light shaft, or vent shaft in every building shall be open and unobstructed from the bottom of such court to the sky with the exception that fire escapes may be built in courts or light shafts, subject to all the provisions of this Chapter.

(d) All windows, doors, or other openings in court walls, except as otherwise provided in this Chapter, shall have metal frames, metal sashes and metal doors with the glazed portion thereof of wired glass.

788. Windows, Cleaning of—Safety Devices.) The owner or agent of every building in the city shall equip each and every window in any such building above the first story thereof with a suitable device or devices which will permit the cleaning of the exterior of each and every window in such building above the first story without danger to the person cleaning such windows, and such devices shall be of such pattern and construction as will reasonably and safely answer the purposes for which they are intended; provided, however, that if windows are of such construction that

they may be easily cleaned from the inside they need not be equipped with such devices.

(See Illustration, Sec. 740b).

789. Dividing Walls and Iron Doors—Openings Inserted.) (a) Wherever openings are to be inserted in dividing walls in buildings, where such dividing walls are required by reason of the large area of such building, or in dividing walls between two or more connected or attached buildings, they shall be provided with incombustible doors as follows:

(b) Such doors may be either sliding doors or swinging doors, and shall be so constructed, installed and maintained that they can be easily opened or closed from either side at all times by any person; provided, however, rolling steel shutters may be used when such openings are not used as exits.

(c) Every such door shall be equipped with a device containing a fusible link or other releasing arrangement of equal efficiency, approved by the Commissioner of Buildings. There shall be one of these immediately above the door opening and one above the opening near the ceiling. Where the ceiling is less than three feet above the door opening, the last mentioned fusible link or releasing device may be omitted, if the doors are so arranged that the operation of any one of the thermostats, or other releasing devices, will result in the closing of the doors on both sides of the walls. Fusible links, or other approved substitute,

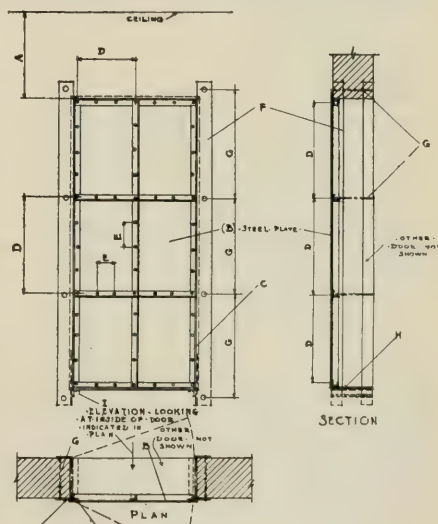


Fig. 28.

DIVIDING WALLS AND IRON DOORS—OPENINGS INSERTED.

Section 789c, f.

- (A) Distance to ceiling.
If A is less than 3' 0" fusible link at ceiling may be omitted.
- (B) Steel plate, No. 12 U. S. gauge or greater.
- (C) Continuous 2" x 2" x 3/8" Ls.
- (D) 2 x 2 x 3/8" Ls forming panels. Angles not less than 2" 0" apart.
- (E) Rivets spaced from 4" to 6" o. c.
- (F) Door frames 3 x 4 x 3/8" Ls (or alternate as by ordinance).
- (G) 3/4" bolts, not more than 2' 0" o. c. fastening frame to wall.
- (H) 1/4" iron or steel sill required.
- (I) Sill fastened to frame by 1 1/2 x 1 1/2 x 1/4" Ls on inner side of frame (Sec. 789f).

Exception: Sill plates may be omitted where floors are of concrete construction.

shall be made so that they will fuse or operate when subjected to a heat of 160 to 165 degrees Fahrenheit. If said doors are of steel plate, the plate or plates shall be of No. 12 U. S. gauge or greater thickness, with a continuous two by two by three-eighths inch angle iron frame extending all around the same and two by two by three-eighths inch panel bars not exceeding twenty-four inches apart, riveted to

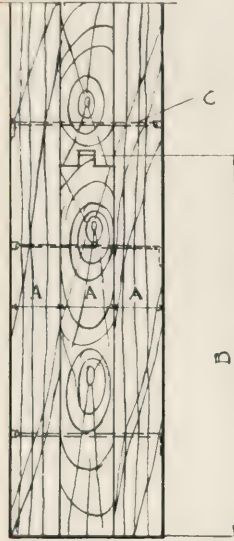


Fig. 29.

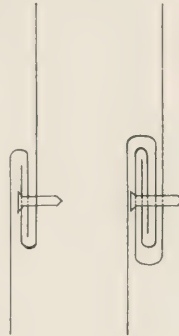


Fig. 30.

Fig. 31.



DIVIDING WALLS AND IRON DOORS—OPENINGS INSERTED—(Continued).

Section 789j.

Fig. 29. Tin-clad Doors.

(A) Three thicknesses of 13/16" required.

(B) Boards not wider than 8". Outside layers vertical and inside layer horizontal laid.

(C) Nails clinched as (C).

Fig. 30. Single locked tin plate seam.

Fig. 31. Double locked tin plate seam.

the plate of the door with not less than three-eighths inch rivets spaced four inches to six inches between centers. Pairs of swinging doors shall be so constructed that when the doors are closed, they will be of strength equal to that of a single door, and shall be so arranged that they will operate automatically. All doors shall be hung on wall frames of four by three by three-eighths inch angle iron or of four by three-eighths inch bar iron stiffened by one and one-half by one and one-half by one-fourth inch angles riveted on the back and fitting snugly to the wall. The frame shall be fastened together by three-fourths inch bolts extending through the wall, such bolts being not more than two feet apart. All doors to be made to fit closely to the wall frame on all sides. Lintels of door openings shall be made of brick, iron or concrete.

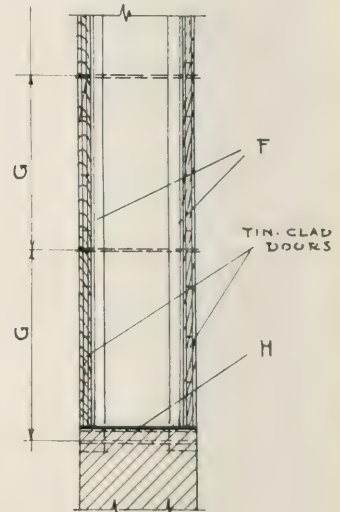
(d) Swinging iron doors shall swing on three wrought iron hinges made of two by three-eighths inch bar iron and shall be secured by at least three lever bars of one and one-half by three-eighths inch iron, working together and so arranged as to be operated on either side of the door.

(e) Sliding iron doors shall slide in channels at the top and bottom; bottom channels shall be formed by two angles two and one-half by three-eighths inch and one and one-half by one-fourth inch; top chan-

nels to be formed by two angles two by three-eighths inch and one and one-half by one-fourth inch; channels shall be securely riveted or bolted through the wall frame and where they extend beyond the wall frame shall be firmly bolted to the wall by expansion bolts. Track shall be without incline, of one-half by one-half inch iron securely riveted on the upper side of the angle iron channel. Hangers shall be of the anti-friction pattern and securely fastened to the door plate by at least four one-half inch bolts. Wheels shall be of cast iron three-fourths by four and one-half inches.

(f) Sills between iron doors shall be of one-fourth inch iron or steel with edges securely fastened to one and one-half by one and one-half by one-fourth inch angle iron or heavier, on the inner side of the wall frame. Where adjoining floors are of concrete construction, sill plates may be omitted.

(g) When tin-clad doors are used they shall be made of three thicknesses of thirteen-sixteenths inch seasoned, non-resinous wood, of good sound quality, free from sap and large or loose knots, tongued and grooved, dressed on both sides and not exceeding eight inches in width. The outside layers shall be vertical, the inside layer shall be horizontal; layers shall be securely fastened together by wrought iron clinch nails driven in flush and clinched so as to



SECTION

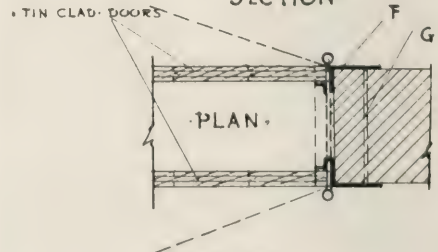


Fig. 32.

Section 789g.

Fig. 32. (H) 1/4 inch iron or steel sill.

(P) 3" x 5" x 3/4" L. riveted to iron sill.

(G) 1/2 inch bolt 18" o. c.

Exception: Sill plates may be omitted where floors are of concrete construction.

leave smooth surfaces. The woodwork shall be thoroughly covered with terne plate tin of size fourteen by twenty inches, weighing not less than one hundred and thirteen pounds per box of one hundred and twelve sheets; all joints shall be locked one-half inch and nailed under seams, except on edges of door; vertical joints shall be double locked, horizontal joints single locked. Nails used to fasten tin shall be No. 13 gauge, flat head, full barbed wire, two inches long.

(h) Swinging tin-clad doors shall have three-eighths by two and one-half inch wrought iron hinges bolted to doors with four three-eighth inch bolts. Doors in excess of seven feet in height shall be provided with three hinges and have wrought iron wall eyes built in wall, or riveted to wall frame, or bolted through wall with three-fourth inch bolts. They shall have at least three level bars of one and one-half by three-eighths inch iron, working together; the latch shall be placed so it can be operated from either side of the door and provided with proper keepers bolted through the door, with the spring to insure latching; catches shall be made of one-half inch wrought iron securely bolted to wall or wall frame.

(i) Sliding tin-clad doors shall have tracks inclined three-fourths inch to the foot, made of three and one-half by three-eighths iron rolled steel, or round bars, or round pipes of equal strength, securely bolted through wall with three-fourths inch bolts. Hangers shall be made of three-eighths by three and one-half inch wrought iron attached by not less than one-inch bolts. Wheels shall be of malleable or wrought iron with not less than one and one-half inches bearing on axle. Doors over six feet wide shall have three hangers and shall be provided with necessary binders, chafing strips, bumpers and bumper shoes.

(j) Sills between tin-clad doors shall be of one-fourth inch iron or steel riveted to a three and one-half by five by three-eighths inch angle iron on each side of the wall; angle irons to be fastened together through the wall by three-fourths inch bolts spaced not to exceed eighteen inches apart; provided, that where adjoining floors are of concrete construction, sill plates may be omitted.

(k) Rolling steel doors used as dividing wall doors shall be made either of wooden slats covered with steel or bronze, or of number 20 U. S. gauge painted steel, or of number 24 U. S. gauge galvanized steel. The edges of such doors shall run in steel channels not less than one and one-half inches deep, and three-sixteenths of an inch in thickness.

(l) Such doors shall be hung on winding shafts and helical springs of sufficient strength to counterbalance the door at any position, and shall be equipped with a device to hold the doors in a closed position if the spring is destroyed. The head of the door opening shall have baffle plates of number 12 U. S. gauge steel, which shall be reinforced around the edges by one and one-half inch angles, to act as fire and smoke stops. The openings for such doors shall have steel frames and sills as herein required for steel swinging doors.

(m) Wherever incombustible doors are to be used in openings to vertical shafts for stairways, passenger and freight elevators, pipes, conduits, and in corridor and room partitions, they may be made of two thicknesses of wood and covered with tin as described in paragraph (g) of this section, or of No. 20 U. S. gauge steel with stiles and rails not less than one and three-fourths inch and panels one-quarter inch thick, and the interior of said doors shall be filled with asbestos or non-resinous wood; provided

however, that in fireproof buildings of Classes IIA, IIB, III, except when used in part as a stable and garage, IV, VI, and VIII, and in fireproof buildings of Class I, when equipped with an automatic sprinkler system, and when the occupancy does not constitute a special fire hazard in the opinion of the Chief of Fire Prevention and Public Safety, these openings, with the exception of openings to freight elevators, may be provided with incombustible doors consisting of a structure of clear, non-resinous wood not less than one and five-eighths inch thick assembled in the form of a core and protected on all surfaces with a pure long fibre asbestos fabric, weighing one and twenty-eight one-hundredths ounces per square foot, or other protective coating equally as incombustible and mechanically bonded therewith and veneered, or consisting of a structure of clear, non-resinous wood with panels not less than three-quarters inch thick and stiles and rails not less than one and five-eighths inch thick assembled in the form of a core and covered on all surfaces with an asbestos fabric and sheet steel, copper or bronze; provided, further, that nothing contained in this paragraph shall be construed as prohibiting the use of such incombustible doors as are described in paragraphs (c), (g) and (k) of this section and paragraph (b) of Section 784. The frames and trim shall be of materials as herein described.

(n) No glass panels shall be permitted in incombustible doors, except that in fireproof buildings of Classes I, IIA, IIB, III except when used in part as a stable or garage, IV, VI and VIII, doors to passenger elevators, stairs, halls, courts, fire escapes, corridor and room partitions, wired glass panels may be used not exceeding one thousand four hundred forty square inches in total area, no division of which shall exceed 720 square inches in area and no dimension of which shall exceed forty-eight inches in extent. Where an elevator or stairway is enclosed with incombustible partitions and doors for the purpose of obtaining credit for additional exits, no glass of any kind shall be permitted in these partitions or doors.

790. Metal or Reinforced Concrete Chimneys in Fireproof Buildings—Air Space.)

(a) Internal chimneys of rolled steel or iron may be built in buildings of fireproof construction, provided that the rolled steel shall be not less than three-eighths inch in thickness, except that the upper fifty feet of such chimney may be one-quarter of an inch in thickness, riveted in every joint, or of cast iron, providing same shall not be less than three-fourths inch in thickness and jointed by bell and spigot joints or flanged bolted joints. All joints in cast iron work shall be filled and pointed with fire clay. Such metal internal chimneys shall be securely and firmly anchored to the framing of such fireproof building at each floor line and at the roof. The lower part of each such chimney shall be lined with insulating lining for a height herein required for the respective area by Section 794 of this Chapter. The insulating lining shall be one of the linings described in Section 796 of this Chapter.

(b) Reinforced concrete not less than four inches in thickness may be used on the interior of fireproof buildings, provided the requirements for reinforced concrete and for reinforced concrete stacks elsewhere required by this Chapter shall be complied with.

(c) Internal metal or re-inforced concrete stacks on fireproof buildings shall be surrounded by continuous air space from the lowest story through the roof not less than four inches across at any point, and said air space shall be surrounded by brick, hollow tile, or reinforced concrete. No structural metal in such air space shall be without such fireproof covering.

791. Reinforced Concrete Chimneys—How Built.) Reinforced concrete chimneys in which the temperature of the gases is intended to exceed 750 degrees Fahrenheit, shall be lined with fire brick or magnesite or asbestos insulating lining for the height and in the manner elsewhere required by this Chapter. If the insulating is stopped anywhere below the top of a reinforced concrete chimney or if the cross section of such a chimney is changed, then the reinforcing shall be increased at such points sufficiently to prevent the formation of temperature cracks.

792. Tenement and Apartment House Boiler Chimneys.) Chimneys for the heating apparatus of tenement and apartment houses shall not be considered as flues used for domestic purposes.

793. Height of Chimneys Above Roof.) (a) The height of all chimneys and flues of stoves used for domestic purposes or open fireplaces shall be not less than five feet higher than the highest point of the roof of the building of which they are a part.

(b) The height of all chimneys and flues above the highest portion of the roof of which they are a part, where such chimneys or flues are used for other than domestic purposes or for open fireplaces, shall be determined by dividing the greatest diameter

of twenty-five feet of any wood tank, pent house, or roof house, on the same building of which such chimney shall be a part shall be at least as high as the top of said wood tank, pent house, or roof house. The tops of chimneys on ridge roofs shall be not less than three feet above the ridge.

794. Insulating Cavities—Where Required.) All flues having a greater area than four hundred square inches shall be lined on the inside with an insulating material, which lining shall start at least two feet below the smoke inlet and shall extend upwards for at least ten times the diameter of the flue, or if said flue is not circular or square in cross section for ten times the average diameter, when the flues are of brick, stone or concrete, said insulating lining shall be fire clay brick or fire clay blocks, and if such bricks or blocks are four inches or more in thickness, they may be considered as a portion of the thickness required for the surrounding walls. The walls surrounding chimneys having an area greater than four hundred square inches shall have an insulating cavity not less than three inches wide surrounding the inner four inches of fire brick or fire clay blocks, for not less than the height required above for insulating lining and said inner core shall be built independent of the surrounding brick work and shall be free to expand or contract.

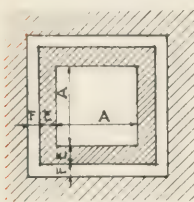


Fig. 33.

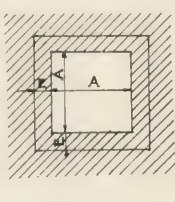


Fig. 34.

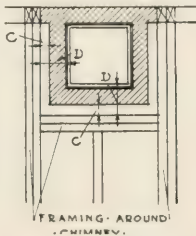


Fig. 35.

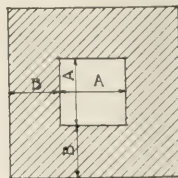


Fig. 36.

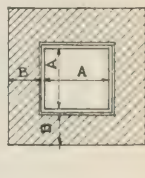


Fig. 37.

CHIMNEYS—INSULATING CAVITIES WHERE REQUIRED.

Section 794.

Figs. 33, 34 (A) Area of flue.

(E) Insulating lining.

(F) Insulating cavity.

Explanation: If A is more than 400 sq. in. an insulating lining (E) is required—(see Sec. 797 for further details). If A is more than 400 sq. in. the walls surrounding shall have an insulating cavity F not less than 3" wide.

If E in Fig. 34 is of fire brick of 4" or more in thickness it may be considered as a portion of thickness required for walls surrounding.

Section 797, Framing Around Chimneys.

Fig. 35. (C) Is distance joists or timbers are to be kept away from walls of chimneys = 2".

(D) Is distance to be kept away from inside of flue lining = 7".

Section 800. Walls Forming Smoke Flues.

Fig. 36. Shows chimney without flue lining.

If A = 144 or less, B = 8".

If A = more than 144 and not more than 600, B = 12".

If A = more than 600, B = 16".

For exceptions see ordinance, Sec. 800.

Fig. 37. Shows Chimney with flue lining, not less than 3/4" thickness.

If A is 144 sq. in. or less, walls surrounding may be (B) or 4".

If A is more than 144 sq. in. and not more than 300 sq. in. B = 9".

If A is more than 300 and not more than 600, B = 12".

If A is greater than 600, B = 16" (exceptions and reductions being stated in Sec. 800).

In inches by four, and the quotient thereby obtained in terms of feet, with five feet added, shall be the minimum height from the tops of such chimneys and flues above the highest portion of roof of the building. In no case shall the height of any chimney or flue be less than five feet above the roof of the building of which it is a part.

(c) Where a wooden tank, pent house or roof house is on the same building with a chimney, the required height of any such chimney above the roof of the building shall be not less than two-thirds of the sum of the horizontal distance between the chimney and such tank, pent house or roof house added to the vertical distance between the top of such tank, pent house, or roof house and a horizontal plane through the top of the chimney. The tops of chimneys within a radius

795. Metal Chimneys in Buildings of Ordinary Slow-Burning or Mill Construction.) Interior stacks or smoke flues of metal shall not be used in buildings of ordinary or slow burning or mill construction, unless they are surrounded by self-supporting brick or re-inforced concrete walls of the thickness herein required for flues of the respective area; provided, however, that if an interior smoke pipe of steel of not less than three-eighths inch in thickness riveted in every joint, or an interior smoke pipe of cast iron not less than five-eighths inch in thickness is used, then the brick work required inside of the insulating cavity of a stack may be omitted, but such metal linings shall be lined with such insulating material for the height herein elsewhere required for stacks. If a chimney or stack

is not a part of the walls of such a building, it shall be designed as an isolated chimney as required by Section 799 of this Chapter.

796. Insulating Material for Metal Chimneys and Metal Stacks.) (a) Fire clay brick or fire clay blocks may be used for the insulating lining of metal chimneys and stacks but not of a lesser thickness than two inches. The material shall be increased in thickness or supported on structural steel ledges and the material shall be stressed not to exceed the safe limits of stress elsewhere herein fixed for the material, or metal chimneys and metal stacks may be lined with blocks of magnesia insulation or with fused asbestos board insulation, or metal stacks or chimneys may be lined with any other insulating material tested and approved by the Commissioner of Buildings.

(b) Magnesia block insulation shall contain not less than 45 per cent of magnesia and 50 per cent asbestos fibre formed into blocks not less than 1½ inches in thickness by hydraulic pressure. After said magnesia blocks have been set, they and all metal bands and ties exposed with the flue shall be plastered with cement not less than one-half inch in thickness on one and one-half inch blocks, and one-fourth inch in thickness on one and three-fourths inch and thicker blocks.

(c) Fused asbestos board shall be made of alternate flat and corrugated sheets of asbestos board, cemented together and fused under a heat of not less than 1,000 degrees Fahrenheit to a minimum thickness of 1¼ inches. After said fused asbestos boards have been set into the flues, they and all exposed metal bands or ties shall be pointed with cement.

(d) Such magnesia blocks, fused asbestos boards, pointing cement and any other insulating material approved by the Commissioner of Buildings shall resist the disintegrating, dissolving, or diminishing action of moist steam and the acid and gaseous fumes present in the flue at any degree of heat obtainable by the combustion of the fuel used.

797. Chimneys — Interior — Framing Around.) In case of chimneys which are enclosed, or form part of the interior of any building, no joists or girders shall rest or be supported on the walls of such chimney, and the framing around chimneys of all kinds shall be so constructed that in no case will any joists or timbers be placed nearer than two inches from the outside face of walls of flues, and in no case shall the distance from the inside of any flue to any joists or timbers be less than seven inches.

798. Chimneys — External Location of.) (a) Chimneys built outside of the walls of buildings shall not encroach upon any street or alley, and shall be built as follows:

(b) If at least one side of such chimney abuts entirely upon the wall of an existing building and the chimney is throughout its entire length securely and firmly anchored to the walls of such existing building, the wall of such chimney may be built of hollow tiles, in which case, however, it shall have a cast iron base, lined with fire brick, extending to a height of at least ten feet above the street or alley grade.

(See Special Ruling XVI, Page 327.)

799. Chimneys — Isolated — Stress Requirement.) Isolated chimneys shall be so designed and constructed that the stress in every part thereof, due to the weight of the chimney itself and from wind pressure, shall not exceed the safe limits as provided in this Chapter for the material used.

800. Walls Forming Smoke Flues.) The walls forming smoke flues of one hundred and forty-four square inches area or less

shall be of brick, concrete, stone, or of any one of these and burnt fire-clay flue tile lining, and such flue linings shall extend from the lowest opening to a distance of at least two feet above the roof joints. If only one of the above materials is used it shall not be less than eight inches in thickness. Provided, however, that such flues having walls at least three inches in thickness of continuous concrete or interlocking or rabbited joint concrete sectional flues may be used without burnt fire-clay flue tile linings. If any one of the above materials is used in combination with burnt fire-clay flue tile lining it shall be not less than four inches in thickness, and the burnt fire-clay flue lining shall be not less than three-fourths inches in thickness, and built as herein described. The walls forming smoke flues of more than one hundred and forty-four square inches area and not more than three hundred square inches area shall be of brick, concrete, stone, or any one of these and burnt fire-clay flue tile lining. If any of the above materials is used alone, it shall be not less than thirteen inches in thickness. If any one is used in combination with burnt clay flue tile lining, it shall be not less than nine inches in thickness and the fire-clay flue tile lining shall be not less than three-fourths inch in thickness and built as herein required. The walls forming flues having an area greater than three hundred square inches and less than six hundred square inches shall be built of one of the materials described above not less than twelve inches in thickness, and flues having an area greater than six hundred square inches shall have walls of one of the materials described above not less than sixteen inches in thickness, and these walls may be reduced to twelve inches in thickness at a point not less than fifty feet above the top of the breeching; provided, however, that the material of which all chimneys are constructed shall be so proportioned that it will not be subjected to a greater stress than elsewhere herein fixed as the maximum safe stress for such material.

801. Ventilating Ducts — Chutes — Walls Forming.) Walls forming ventilating ducts and rubbish and ash chutes shall be constructed in accordance with the regulations governing the construction of smoke flues elsewhere herein contained. Walls forming ventilating ducts shall not be less than four inches thick, and when the ventilating duct is larger than two hundred and sixty square inches the walls shall be not less than eight inches thick.

802. Smoke Pipes Passing Through Partitions.) In buildings hereafter erected it shall be unlawful to allow smoke pipes of greater diameter than six inches to pass through a combustible partition. Where a smoke pipe of six inches or less passes through a combustible partition it shall be surrounded by a ventilated thimble of incombustible material or by incombustible material with a diameter at least eight inches greater than the diameter of the pipe.

803. Boilers — Location of — Permit for.) In all cases, boilers shall be so placed as to give ample room between any ceiling, wall or partition to connect or operate any valves or pipes or other connections used on such steam boilers. The size, number and location of boilers to be installed in any building shall be marked on the plans and, except in buildings of Class III, approved by the Department for the inspection of Steam Boilers and Steam Plants, and by the Department of Health before a permit is issued by the Department of Buildings for the erection of such building.

804. Foundry Cupolas — Construction of Charging Floors and Roofs — Height Above Roof.) There shall be no combustible material used in the construction of a charging

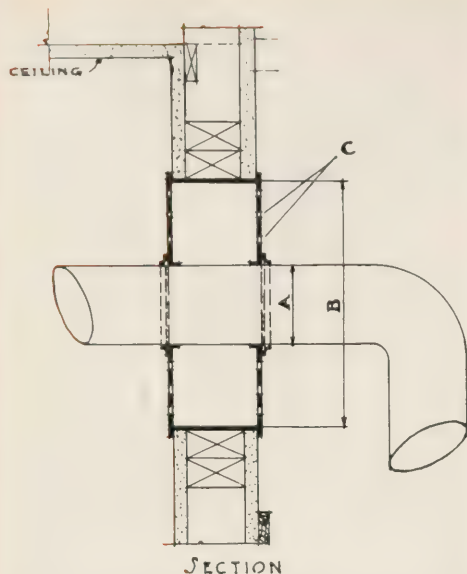


Fig. 38.

SMOKE PIPES PASSING THROUGH PARTITIONS AND WOOD WORK AROUND.

Section 802.

- (A) Diameter of smoke pipe, 6" or less.
- (B) Diameter of thimble required 8" greater than diameter of smoke pipe.
- (C) Ventilation holes required.

floor or a roof within thirty-six inches of the foundry cupola. Where the charging floor is less than eight feet above the dump floor no combustible material whatever shall be used in the construction of such charging floor. Foundry cupolas shall extend twenty-five feet above the highest point of any roof within a radius of forty feet from such cupola, unless such roof is of metal or fireproof construction.

805. Cornices — Eaves — Gutters — Pipes from Roof.) (a) Wood shall not be used for any purpose in connection with cornices and eaves on any building more than fifty feet in height. The entire exterior covering of cornices and eaves of buildings hereafter to be erected within the fire limits shall be of incombustible material.

(b) Wherever sheet metal cornices or eaves are used, their entire exterior covering shall be of metal or other incombustible material approved by the Commissioner of Buildings. Bracket supports for same shall be firmly secured to the wall at least every four feet, and the walls shall be carried full height under and behind same throughout their entire length.

806. Towers, Domes and Spires—Construction of.) Towers, domes and spires may be built on top of the roofs of buildings, but shall not occupy more than one-quarter of the street frontage of any building. Such towers, domes, or spires, if any part thereof is built to a height of more than fifty feet and less than ninety feet, shall be of slow-burning construction, and, if of a greater height than ninety feet above the sidewalk, shall be of fireproof construction; and, in all cases where the area of such tower, dome, or spire exceeds one hundred square feet, its supports shall be carried down to the ground, and if the structure supported is more than fifty feet and less than ninety feet high, it shall be of slow-burning construction, and, if more than

ninety feet high, of fireproof construction. No tower, dome, or spire shall exceed thirty-six hundred (3,600) square feet in area, and in no case shall the area exceed fifteen per cent of the total area of the building on which it is erected, nor shall the height of any tower, dome or spire exceed four hundred feet measured from the established inside grade.

807. Structures—Construction and Limitations of.) All structures built within the City other than those otherwise specifically provided for herein shall be designed and constructed according to established engineering practice, and shall comply with the provisions of this section. No structure of frame or mill construction within the fire limits shall exceed 35 feet in height from the ground to the highest point thereof. No structure of mill or frame construction outside the fire limits shall exceed the height of 45 feet from the ground to the highest point thereof.

All structures over thirty-five feet in height within the fire limits, and all structures over forty-five feet in height outside the fire limits shall be built of structural steel, concrete or masonry; provided, however, that viaducts or runways to be used for the purpose of transferring livestock from one building or place to another may be built of wood not to exceed eighty feet in height either within or without the fire limits.

If it is desired to enclose any structure, such structure shall be enclosed with concrete or masonry walls, or incombustible material of such construction as shall be approved by the Commissioner of Buildings; provided that structures outside the fire limits not exceeding 2,800 square feet in area, or 45 feet in height, may be enclosed with combustible material.

In every structure contemplated by this section safe and adequate means of ingress and egress shall be provided for persons employed in and about the same.

All structures whose height exceeds twice their least dimensions at their base shall be so designed as to safely resist a wind pressure of 30 pounds per square foot of surface exposed to the action of the wind.

808. Skylights—Construction of—Glass in.) (a) Any skylight on the roof of any building less than ninety feet in height, other than a frame building, shall have the sides, sashes and frames constructed of metal, or of wood, metal clad on all exterior surfaces. Any skylight on a building more than ninety feet in height shall be entirely of incombustible material.

(b) Every skylight shall be provided with ventilation opening of an area of at least three per cent of the base area of the skylight.

(c) The glass in all such skylights, except in buildings in Classes III and VI not exceeding three stories in height, shall have at least six inches over same a strong wire netting with wire not lighter than number twelve gauge, galvanized after weaving, and mesh not coarser than one by one inch, unless the glass contains a wire netting within itself. Supports for screen shall not be less in size than the bars supported and of the same material.

809. Inclosures upon roof.) Skylights, inclosures for water tanks and inclosures for elevator machinery, the construction of all of which inclosures shall be entirely of incombustible material, shall be permitted to be erected on the roofs of all buildings more than fifty feet and less than one hundred feet high; provided, however, that the roofs of same may be built of mill or slow-burning construction.

810. Roof—Construction of—Pitch of.) Buildings, other than frame buildings when permitted by this Chapter, less than fifty feet in height with roofs which have a slope of more than three inches per horizontal foot, shall have the roofs covered with incombustible material. Buildings more than fifty feet and less than one hundred feet in height with roofs which have a slope greater than three inches per horizontal foot and which are of timber construction, shall have such roofs covered with an incombustible covering upon the roof boards, which shall be made either of mortar or porous terra cotta or plaster boards or other incombustible material, which shall be at least two inches thick. Where this covering is placed upon the roof boards wooden strips shall be inserted, which shall be securely fastened to the wooden structure at regular intervals between the incombustible covering and a weatherproof covering of incombustible material.

811. Roofs—Shingle, Gravel or Composition.) (a) The use of shingles or other forms of combustible roof covering on buildings erected or altered otherwise than is provided in Section 871, within the fire limits, is prohibited, except as hereinafter provided. In existing frame buildings not more than three stories high, the shingle roofs may be repaired with shingles or other materials.

(b) Roofs, the slope of which is not more than three inches per foot horizontal, and the covering of which is made of a composition of felt and gravel, shall be considered incombustible under the provisions of this Chapter, and may be used upon buildings of all classes. Other forms of composition roof shall be permitted if expressly approved as an incombustible roof by the Commissioner of Buildings.

812. Buildings—Height of—Parapet Walls—Roof Houses—Housing Tanks—Skylights and Scuttles.) (a) The limits of heights of buildings heretofore given for non-fireproof buildings shall be the perpendicular distance from the inside sidewalk grade of the street nearest the building to the highest point of the roof thereof. Where such street grade varies, the mean or average grade thereof opposite the building shall be the data from which such height is measured.

(b) The height of a fireproof building shall be the perpendicular distance from the inside sidewalk grade of the street nearest the building to the highest point of the external bearing walls. Where such street grade varies, the mean or average grade thereof opposite the building shall be the data from which such height is measured.

(c) No building shall be erected in the City of greater height than two hundred sixty feet. The erection of parapet walls or of balustrades constructed entirely of incombustible material shall be permitted above the roof level of buildings of all classes, in addition to the height fixed herein for the same.

(d) Roof houses for elevators, tanks, skylights, stairs or scuttles may be built above the height of the main roof.

813. Basement—Defined.) The upper surface of the floor of the first story of buildings of every class excepting Classes VI and VIII shall be not more than ten feet three inches above the inside sidewalk grade of the street nearest the building and that portion of the building below said floor shall be designated as the basement of the building of which it is a part.

Note: See Section 634 (h).

814. Sub-basements and Cellars—Construction of.) (a) No building shall have more than one basement or cellar of ordinary or slow-burning or mill construction; all additional basements or cellars shall be of fireproof construction as described in this Chapter, the elevator enclosures shall

be of brick from the lowest basement floor level to the first story floor, and the stairways shall be inclosed in fireproof partitions from the lowest basement floor level to the first story floor level with automatic closing standard iron doors, opening outwards.

(b) In cases where a pipe, conduit, dumb-waiter, cable, wire, conveyor or belt, or any combination thereof, passes through a floor from one basement to another, the opening in the floor shall be inclosed as specified in this Chapter.

(c) The number and width of stairs from the lowest basement floor to the first story shall be the same as required for the four highest stories of a building of the same area.

815. Concrete Floors in Basements—Requirements.) Wherever concrete floors are laid in basements of buildings now in existence or buildings hereafter to be erected, the concrete of such floors shall be at least three (3) inches in thickness and such floors shall be laid on a sand or cinder foundation not less than six (6) inches in thickness.

816. Canopy—Plans Must be Approved Before Permits Issue—Fee for Permit—No Advertising Matter or Obstructions Permitted.) It shall be unlawful for any person, firm or corporation to erect or construct any canopy attached to a building or structure under any general or special ordinance now in force or which shall or may hereafter be adopted without first submitting the plans of such canopy, and also of the part of the building or other structure to which it is to be attached, to the Commissioner of Buildings for his approval. No permit shall be issued by the Department of Public Works unless the plans of such canopy shall be approved by the Department of Buildings and a permit to attach said canopy to the building from which it is intended to project shall be obtained from the Commissioner of Buildings. The owner or agent shall pay to the Department of Buildings a fee of ten dollars for said building permit. No canopy that has been or may hereafter be authorized by any general or special ordinance, which projects over any street or other public place shall at any time be enclosed by canvas or other cloth or material in whole or in part so as to obstruct free passage underneath same, nor shall any such canopy be equipped with or have attached thereto any illuminated or other signs, transparencies, placards, streamers or other advertising devices of any kind; and in case any such canopy shall at any time contain such advertising matter or device it shall be the duty of the owner, lessee or person in charge or control of such canopy, upon notice from the Mayor, to forthwith remove such advertising matter or device.

817. Canopies and Marquees—Annual Inspection Fee.) The Commissioner of Buildings shall make an annual inspection of canopies and marquees attached to buildings or other structures which shall extend into or over any street, alley or any public place, and for such inspection shall make the following charge:

Where the horizontal projection of the canopy or marquee does not exceed 200 square feet in area the annual inspection fee shall be five dollars; and where the horizontal projection of the canopy or marquee exceeds 200 square feet in area the fee shall be five dollars for the first 200 square feet and one dollar additional for each additional 50 square feet in the area of such canopy or marquee.

818. Scaffolds—Protection During Building Operations—Temporary Floors.) (a) All scaffolds erected in this city for use in the erection, repair, alteration, or removal of buildings, shall be well and safely supported, and of sufficient width, and properly secured, so as to insure the safety of per-

sons working thereon or passing under or by the same; and to prevent the falling thereof, or the falling therefrom of any material that may be used, placed or deposited thereon.

(b) It shall be the duty of every owner, person or corporation who shall have the supervision or control of the construction of or remodeling of any building having more than three framed floors, whether some or all of such floors are above the established street grade, to provide and lay upon the upper side of the joists or girders, or both, of the first floor below the riveters and structural steel setters, a plank floor, which shall be laid to form a good and substantial temporary floor for the protection of the employees and all persons engaged above or below or on such temporary floor in such building.

(c) Provided, however, that where the permanent floor is in place on the floor herein required to be planked, a temporary protective floor shall not be required.

(d) A good and substantial temporary floor shall be laid on the joists or girders of the next lower floor where the temporary or permanent floor of the second story or the floor or floors above the second story or roof is being placed previous to the placing of the permanent floor or floors immediately below the floor which is being arched or planked. The lowest framed floor in a building shall be considered the first floor.

(e) In buildings more than three stories high where persons are working on a scaffold or scaffolds on the outside of such building such persons shall be protected by well secured planking, set over the heads of such persons for the full width of the scaffolding on which they are working if another story or other stories are being raised above such persons during the time they are working on such outside scaffold or scaffolding.

(f) It shall be the duty of all owners, contractors, builders or persons having the control or supervision of all buildings in course of erection which shall be more than thirty feet high, to see that all stairways, elevator openings, flues and all other openings in the floors shall be covered or properly protected, and it shall be their further duty to comply with an act of the Legislature of the State of Illinois, entitled "An act providing for the protection and safety of persons in or about the construction, repairing, alteration or removal of buildings, bridges, viaducts and other structures, and to provide for the enforcement thereof," approved June 3, 1907, and in force July 1, 1907.

(g) Any person, firm or corporation violating any of the provisions of this section shall be fined not less than one hundred dollars nor more than two hundred dollars for each offense, and any permit granted for the construction of such building may be revoked in the discretion of the Commissioner of Buildings where such violation occurs.

819. Wood Lathing and Plastering.) (a) In all buildings of frame or of ordinary construction, where the use of wood lath and plaster is permitted under the provisions of this chapter, such wood lath and plaster shall be done in accordance with the following specifications:

Wood lath shall not be over one and one-half inches wide, and shall be nailed to each stud, joist or bearing with not less than a three-penny fine 16 gauge nail; lath to have joints broken with not over seven lath to a break; lath to be spaced not less than one-fourth of an inch apart. All wood lath must be covered with at least two coats of plaster; such lath and plaster to finish to a total thickness of at least seven-eighths of an inch; no dirty or loamy sand to be used in the mortar or plaster.

(b) In every building of frame or of ordinary construction which contains one or more rooms used for habitation or living purposes, the walls and ceilings of all rooms, including stores (except basement and attic rooms, not used for habitation or living purposes), throughout the building shall be covered with not less than two coats of plaster of the thickness and quality hereinbefore in this section prescribed. Provided, however, that where such building does not exceed one story and basement in height and contains a room or rooms used for the purposes of Class I as defined in this ordinance, a metal ceiling may be installed in the room used for the purpose of Class I; and provided further, that where such building of frame or of ordinary construction and containing one or more living rooms is more than one story and basement in height and contains a room or rooms used for the purposes of Class I as defined in this ordinance, a metal ceiling may be installed in such room used for the purpose of Class I according to the following provisions:

The ceiling of the room or rooms used for the purpose of Class I shall be plastered with at least one coat of plaster on wood lath; wood lath to be not over one and one-half inches wide, and shall be nailed to each stud, joist or bearing with not less than a three-penny fine 16 gauge nail; lath to have joints broken with not over seven lath to a break; lath to be spaced not less than three-eighths of an inch apart. All wood lath to be covered with a heavy coat of mortar; such lath and plaster to finish to a total thickness of three-quarters of an inch in thickness. Before applying such metal ceilings, a wood strip not less than seven-eighths of an inch by one and one-quarter inch wide shall be used under every lap bead, or nailing flange at the intersection of all plates. Strips to be not more than two feet on centers in the direction of length of rooms with a cross strip every four feet on centers. A wire nail not less than three inches long shall be used in every strip at every joist in the surface to be covered. Metal plates to be not lighter than 29 gauge in thickness and nailed to every six inches on the lap.

(c) Where said metal-plates are applied on walls of buildings of frame or of ordinary construction containing one or more rooms used for habitation or living purposes, plastering upon walls must conform with the requirements of this section for plastered walls. A strip three-eighths of an inch in thickness may be used upon which to apply the metal, same to be nailed to every stud with a nail not less than two and three-quarter inches long; steel plates used on walls to be not lighter than 29 gauge and applied same manner as herein provided for ceilings.

(d) Wallboard or plasterboard of gypsum, asbestos, or other approved incombustible material, containing not more than four per cent (4%) by volume of paper or other combustible fabric reinforcement may be used as a substitute for wood lath where the use of wood lath is permitted by the provisions of this chapter in buildings of frame or of ordinary construction. When such wallboard or plasterboard is attached to metal studding or metal furring and is used as a base for two coats of plaster or mortar, the wallboard or plasterboard and plastering finishing to not less than seven-eighths of an inch in thickness in ceilings and in hollow partitions and not less than two inches in thickness in solid partitions. It may be used in this manner in such buildings and under such conditions as follows:

In buildings of slow burning and mill construction for partitions other than corridor partitions and other than enclosing partitions around stairways, elevators, shafts or other floor openings.

In buildings of fireproof construction of Class II, Class III and Class VI for suspended or false ceilings below a fireproof floor system or roof system built in accordance with the provisions of this chapter and for partitions other than corridor partitions and other than enclosing partitions around stairways, elevators, shafts or other floor openings. The ingredients and the proportions thereof for mortar and plaster and the manner of mixing and preparing same for plastering, as used in accordance with the requirements of this section, shall be subject to the approval of the Commissioner of Buildings.

821. **Sidewalk—Delivery of Material—Elevated Sidewalks.)** It shall be permitted for the purposes of delivering material to the basements of buildings in process of erection to erect elevated temporary sidewalks to a height of not exceeding four feet above the curb level of the street, and in case a sidewalk is so elevated it shall be provided with good, substantial steps or easy inclines on both ends of the same and shall have railings on both sides thereof.

822. **Temporary Roof Over Sidewalk—Time Maintained.)** When buildings are erected of a height greater than four stories

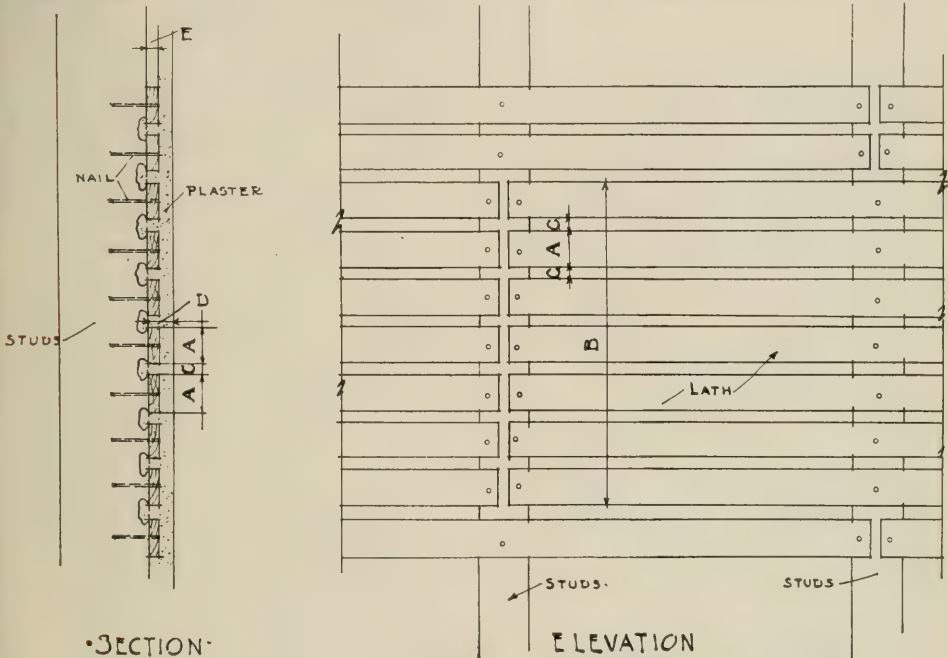


Fig. 39.

WOOD LATH AND PLASTERING.

Section 819.

- (A) Lath to be $1\frac{1}{2}$ " wide.
- (B) Break joints of lath every seventh lath.
- (C) Spacing of lath not to be less than $\frac{1}{4}$ " apart.

(Exception Class I— $\frac{3}{8}$ " spacing allowed—see Sec. 819b).

(D) Plaster coating to finish $\frac{3}{8}$ " thick.

(Exception Class I— $\frac{3}{4}$ " thick finish—see Sec. 819b).

820. **Sidewalk and Street—Occupation of—Limitations.)** (a) The extent of occupation of sidewalk and street to be covered by the terms of a permit for street obstruction or building, shall be as follows:

(b) Such permit shall not authorize the occupation of any sidewalk or street or part thereof other than that immediately in front of the lot or lots upon which any building is in process of erection and in relation to which such permit is issued.

(c) During the progress of building operations, a sidewalk not less than six feet in width shall be at all times kept open and unobstructed for the purpose of passage in front of such lot or lots. Such sidewalk shall, if there are excavations on either side of the same, be protected by substantial railings which shall be built and maintained thereon so long as excavations continue to exist. It is not intended hereby to prohibit the maintenance of a driveway for the delivery of material across such sidewalk from the curb line to the building site.

and such buildings are near the street line, there shall be built over the adjoining sidewalk a roof having a framework composed of supports and stringers of three by twelve timbers not more than four feet from center to center, covered by two layers of two-inch plank. When additional stories are added to an existing building and such building is located near the street line, there shall be built over the sidewalk, at the point where the new stories commence, a scaffold not less than six feet wide, which shall form a covering over the sidewalk composed of a framework of stringers and supports, covered by two layers of two-inch planks. Such framework and covering shall be of such construction and design as shall be satisfactory to the Commissioner of Buildings. Such roof shall be maintained as long as material is being used or handled on such street front above the level of the sidewalk. Temporary sidewalks, their railings, approaches and roofs over same, shall be made with regard to ease of approach.

strength, and safety, to the satisfaction of the Commissioner of Buildings.

823. Storage of Building Materials—Limitations.) The occupation of the street for the storage of building material for any one building or for temporary sidewalks, shall never exceed one-third of the width of the roadway of the same, and in no event shall any material be stored or placed within four feet of any steam or street railway track, and in all cases where such obstruction of the street is made there shall be a clear space of not less than one foot between such obstruction and the curb line. Provided, that the Commissioner of Buildings and the Commissioner of Public Works, or either of them, may limit, or entirely restrict, the storage of material on any street or alley where a tunnel, conduit, or any underground passageway or subway is located.

824. Sidewalks and Street—Excavated Material and Rubbish On—How Cared for.) Earth, other than sand to be used in the construction of the building, taken from excavations, and rubbish taken from buildings shall not be stored either upon the sidewalks or roadways of streets, and shall be removed therefrom from day to day as rapidly as produced. When dry rubbish is being handled, it shall be kept wetted down so as to prevent its being blown about by the wind.

825. Use of Derricks.) For all buildings more than four stories in height the use of derricks set upon the sidewalk or street is prohibited. In no case shall the guy lines be less than fifteen feet above the roadbed.

826. Frontage Adjacent—How Occupied for Building Purposes.) If the written consent of and a waiver of claims for damages against the city by the owners of properties adjoining the site of any proposed building is first obtained and filed with the Commissioner of Public Works, the permission to occupy the roadway and the sidewalk may be extended beyond the limits of such building in front of the property for which the consent of the owner or lessee thereof has been secured upon the same terms and conditions as those herein fixed for the occupation of sidewalk and street in front of the building site.

827. Street—Use of for Building Purposes—When Terminated—Red Lights.) (a) The permission to occupy streets and sidewalks for the purposes of building is intended only for use in connection with the actual erection, repair, alteration or removal of buildings, and shall terminate with the completion of such operation. It shall be unlawful to occupy any sidewalk or street after the completion of the operation for which a permit has been issued by the Department of Buildings. It shall also be unlawful to occupy a sidewalk or street, under authority of such permit, for the storage of articles not intended for immediate use in connection with the operations for which such permit has been issued.

(b) Red lanterns shall be displayed and maintained during the whole of every night at each end of every pile of material in any street or alley and at each end of every excavation.

828. Street Obstructions—Permits—Bonds—Fees.) (a) Permits for the obstruction of streets shall be issued by the Commissioner of Public Works and shall be paid in proportion to the street frontage occupied at the rate of five dollars per month for every twenty-five feet or fractional part thereof, of frontage so occupied, and before any permit shall be granted to any person, firm or corporation for the obstruction of any street or streets or sidewalk, an estimate of the cost of restoring said street and sidewalk to a condition equally as good as before it shall have been obstructed,

with a fair additional margin for contingent damages, shall be made by the Commissioner of Public Works. Such estimate in no case shall be less than two dollars per foot, or fractional part thereof, frontage of the portion of the street to be obstructed, and a deposit shall be required of the person, firm or corporation desiring to obstruct said street or sidewalk. Such deposit, less the charge of five dollars per month for each twenty-five feet of frontage used, shall be returned upon the restoration of the said street and sidewalk to a condition equally as good as before it was obstructed. When the Commissioner of Public Works shall receive satisfactory proof that said street and sidewalk have been restored to a condition equally as good as before it was obstructed, he shall issue a certificate to the Comptroller, certifying to said fact, and the comptroller shall thereupon forthwith issue a warrant on the City Treasurer for the amount of money thus deposited less the deduction herein provided for. But if the person, firm or corporation thus obstructing said street or sidewalk shall fail to restore the same to a condition equally as good as before it was obstructed within three days from and after the completion of the building or structure for which said deposit was required, then the city shall have the right to use such portion of said deposit as may be necessary to remove the obstructions and to restore the said street and sidewalk to a condition equally as good as it was before it was obstructed, and the amount thus expended shall be deducted from the amount of said deposit; provided, however, that nothing herein contained shall preclude the city from maintaining any action against the person, firm or corporation to recover for damage done to any street or sidewalk. No permit shall be issued until the applicant therefor shall have executed and filed with the Commissioner of Public Works a bond, with sureties to be approved by said Commissioner, and in an amount to be designated by him, in no case to be less than ten thousand dollars, conditioned to indemnify, save and keep harmless the city from any and all loss, cost, expense or liability of any kind whatsoever which it, the city, may suffer or be put to, or which may be recovered from it from or by reason of the issuance of such permit, or by reason of any act or thing done or neglected to be done under or by virtue of the authority given in such permit and the requirements of the city ordinances.

(b) Any permit issued pursuant to the terms of this section may be revoked by the Commissioner of Public Works at any time.

829. Building Operations at Night in Residential Districts Prohibited—Penalty.) It shall be unlawful for any person, firm or corporation, in conducting any building operations between the hours of ten o'clock in the evening and four o'clock in the morning to operate or use any pile drivers, steam shovels, pneumatic hammers, derricks, steam or electric hoists or other apparatus, the use of which is attended with loud or unusual noise in any block in which more than half of the buildings on either side of the street are used exclusively for residence purposes.

Any person, firm or corporation violating any of the provisions of this section shall be fined not less than five dollars, nor more than one hundred dollars for each offense, and each day's violations of same shall be considered a separate and distinct offense.

830. Stables and Barns—Regulations.) (a) It shall be unlawful for any person, firm or corporation to convert any building for the use of or to construct or maintain any stable or barn for the housing or keeping of more than two horses or other animals

on any lot abutting on a street or alley in which a public sewer is constructed without providing such stable or barn with an impervious floor properly drained to such sewer.

(b) It shall be unlawful for any person, firm or corporation to construct, locate, conduct or maintain any boarding, sales or private stable or barn for stabling or keeping of horses on the front two-thirds of any lot on any street where one-half of the buildings on both sides of the street between the next nearest intersecting streets are used exclusively for residence purposes without the written consent of a majority of the property owners according to frontage on both sides of the streets. Such written consent shall be obtained and filed with the Commissioner of Buildings before a permit is issued for the construction or alteration of any building or place for such purpose. Provided that in determining whether one-half of the buildings on both sides of the street are used exclusively for residence purposes any building fronting upon another street and located upon a corner lot shall not be considered.

(c) It shall hereafter be unlawful for any person, firm or corporation to locate, build, construct or maintain any building or structure for stabling or keeping of ten or more horses within a distance of four hundred feet from any school, church, hospital, public park or public playground.

(d) Any person, firm or corporation violating any of the provisions of this section shall be fined not less than twenty-five dollars (\$25.00) nor more than two hundred dollars (\$200.00) for each offense and each and every day on which such person, firm or corporation shall conduct or maintain a stable or barn in violation of the provisions of this section, shall constitute a separate and distinct offense.

831. Tannery Not to Be Placed Within 600 Feet of Any Church, Public or Private School.) It shall be unlawful for any person, firm or corporation to build, construct, locate or maintain any building used, or to be used, for a tannery within six hundred feet of any building used for a church, hospital, public or private school, measured from the nearest point of the tannery to the nearest point of such church, hospital or school.

832. Gas Reservoir Not to Be Placed Within 500 Feet of any Public School.) It shall be unlawful for any person, firm or corporation to build, construct, locate or maintain any tank used or to be used for a gas reservoir within 500 feet of any public school. Said distance to be measured from the nearest point of the building or structure used for a gas reservoir to the nearest point of any building used for a public school.

ARTICLE XIV.

Fireproof Construction.

833. Fireproof Construction—Definition of.) The term "fireproof construction" shall apply to all buildings in which all parts that carry weights or resist strains and also all exterior walls and all interior walls and all interior partitions and all stairways and all elevator inclosures are made entirely of incombustible material, and in which all metallic structural members are protected against the effects of fire by coverings of a material which shall be entirely incombustible, and a slow heat conductor, and hereinafter termed "fireproof material." Reinforced concrete as defined in this ordinance shall be considered fireproof construction, when built as required by Section 776.

834. Fireproof Material—Definition of.) The materials which shall be considered as filling the conditions of fireproof covering are: First, burnt brick; second, tiles of burnt clay; third, approved cement concrete; fourth, terra cotta.

835. Fireproof Construction—Tests For—Board of Examiners.) (a) In cases in which it is claimed that any equally good or more desirable mode or manner of construction, or material, or device for fireproofing, other than specified in this Chapter, can be used in the erection or alteration of buildings, the Commissioner of Buildings, upon written application to him for a permit to use the same, shall have power to appoint a Board of Examiners, consisting of not less than three nor more than five members, each of whom shall have at least ten years' experience as an architect, engineer or builder, who shall take the usual oath of office. Said oath of office shall be administered by the Commissioner of Buildings. The said examiners shall adopt rules and specifications for examining and testing such mode or manner of construction or material, or device for fireproofing, and furnish a copy of the same to the applicant. And such specifications shall provide that the material to be tested shall withstand successfully a fire of two hours' duration, rising to 1,700 degrees temperature, Fahrenheit, in the first thirty minutes and remaining at that temperature for the following ninety minutes. At the end of the two hours the material shall be quenched for at least five minutes with a stream of water from a one and one-eighth inch nozzle, at a nozzle pressure of fifty pounds per square inch. The said examiners shall notify such applicant to submit the proposed material for such examination and test; and such tests shall be made in the presence of the said examiners, or a majority thereof, according to such rules and specifications. All expenses of such examiners and such examinations and tests, shall be paid by the applicant, and said examiners may require security therefore.

(b) The said examiners shall within 30 days after such examination and tests, certify the results of such test, and their decision on the said application to the Commissioner of Buildings, who shall in the event of the examination and tests being satisfactory, authorize the use of such material or construction as fireproof material.

(c) A complete record of the proceedings and all acts and decisions of the said Board of Examiners shall be kept by the Commissioner of Buildings in his office.

(d) The Commissioner of Buildings shall have the power to pass upon any question relative to the mode or manner of construction or materials to be used for fireproofing in the erection or alteration of any building or structure to make the same conform to the true intent and meaning of the several provisions of this Chapter.

836. Incombustible Material.) The following materials shall be considered as incombustible material: A metal or fire-resisting glass not less than one-quarter of an inch in thickness, metal, plastering on metal lath and metal-studding, plaster blocks, stone, granite, marble, approved cinder concrete, or one of the fireproof materials described in this chapter.

837. Walls—Enclosing in Buildings of Steel Skeleton Construction.) If buildings are made of fireproof construction, and have skeleton construction so designed that their enclosing walls do not carry the weight of floors or roof, then their walls shall not be less than twelve inches in thickness; provided, such walls shall be thoroughly anchored to the iron skeleton, and whenever the weight of such walls rests upon beams or columns, such beams or columns shall be made strong enough in each story to carry the weight of wall resting upon them without reliance upon the walls below them. All walls shall be of fireproof or incombustible material.

838. **Columns—Exterior protection.** (a) All iron or steel used as vertical supporting member of the external construction of any building exceeding fifty feet in height shall be protected against the effects of external change of temperature, and of fire by a covering of fireproof material consisting of at least four inches of brick, hollow terra cotta concrete, burnt clay tiles, or of a combination of any two of these materials, provided that their combined thickness is not less than four inches. The distance of the extreme projection of the metal, where

such metal projects beyond the face of the column, shall be not less than two inches from the face of the fireproofing; provided, that the inner side of exterior columns shall be fireproofed as hereafter required for interior columns.

(b) Where stone or other incombustible material not of the type defined in this ordinance as fireproof material is used for the exterior facing of a building, the distance between the back of the facing and extreme projection of the metal of the column proper shall be at least two inches.

Fig. 40.

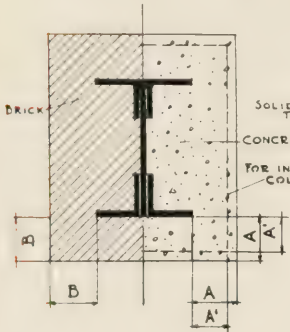


Fig. 41.

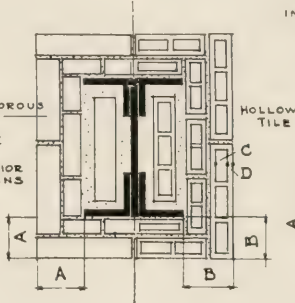


Fig. 42.

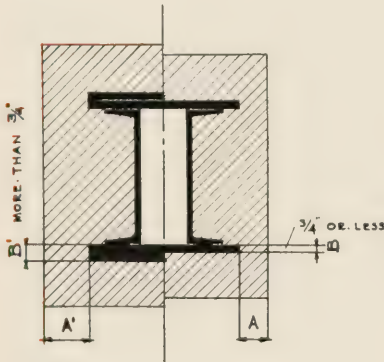
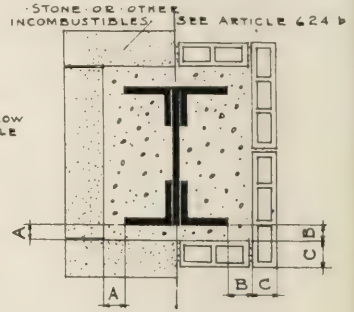


Fig. 43.

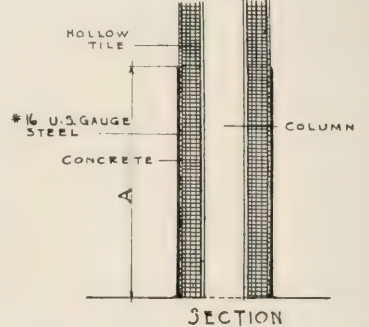


Fig. 44.

PROTECTION OF EXTERIOR COLUMNS.
Section 838.

Figs. 40, 41, 42. Requirement for protection of columns of building exceeding 50 ft. height from external change of temperature and fire.

Fig. 40. (A) 4" concrete required.

(B) 4" brick required.

Fig. 41. (A) 4" solid porous tile required.

(B) 4" hollow tile required.

Fig. 42. (A) If stone or other incombustible material is used for exterior facing then (A) can equal 2".

(B) (C) Combination of materials in fire-proofing, etc., is allowed as at (B plus C), providing their combined thickness is not less than 4 inches.

PROTECTION OF INTERIOR COLUMNS.

Section 839.—Requirements for Interior Columns.

Fig. 40. (A') Concrete 3" (shown dotted).

(B) Brick 4".

Fig. 41. (A) Solid porous tile, two layers of 2" each tile.

(B) Hollow tile, 2 layers of 2" each.

For hollow tile (C) is to equal 1½" air space, and (D) not less than 5/8".

Fig. 42. (B plus C). Each equal ½ thickness required, if used singly, provided if concrete (B) is used it shall not be less than 2".

Section 839c.

Fig. 43. In case of H shaped cross section of columns, etc., fire-proof covering may be reduced to 2½" (A) providing (B) flange projection is ¾" or less.

If (B) is more than ¾" as at (B') then A must be as before specified for interior columns as at (A').

Section 840b.

Fig. 44. Drawing showing protective casing for lower part columns. (A) = 6" 6".

and the intervening space shall be filled with one of the fireproof materials.

(c) In all cases, the brick, burnt clay, tile or terra cotta, if used as a fireproof covering, shall be bedded in cement mortar close up to the iron or steel members, and all joints shall be made full and solid.

(Exterior and Interior Illustrations on the next page.)

839. Columns—Interior.) (a) Covering of interior columns shall consist of one or more of the fireproof materials herein described.

(b) If such covering is of brick it shall be not less than four inches thick; if of concrete, not less than three inches thick; if of burnt clay tile, such covering shall be in two consecutive layers, each not less than two inches thick, each having one air space of not less than one-half inch, and in no such burnt clay tile shall the burnt clay be less than five-eighths of an inch thick; or if of porous clay solid tiles, it shall consist of at least two consecutive layers, each not less than two inches thick; or if constituted of a combination of any two of these materials, one-half of the total thickness required for each of the materials shall be applied, provided that if concrete is used for such layer it shall not be less than two inches thick.

(c) In the case of columns having an "H" shaped cross section or of columns having any other cross section with channels or chases open from base plates to cap plates on one or more sides of the columns, then the thickness of the fireproof covering may be reduced to two and one-half inches, measuring in the direction in which the flange or flanges project, and provided that the thin edge in the projecting flange or arms of the cross sections does not exceed three-quarters of an inch in thickness. The thickness of the fireproof covering on all surfaces measuring more than three-quarters of an inch wide and measuring in a direction perpendicular to such surfaces shall be not less than that specified for interior columns in the beginning of this section, and all spaces, including channels or chases between the fireproof covering and the metal of the columns, shall be filled solid with fireproof material. Lattice or other open columns shall be completely filled with approved cement concrete.

840. Columns—Wiring Clay Tile On.) (a) Burnt clay tile column covering shall be secured by winding wire around the columns after the tile has all been set around such columns. The wire shall be securely wound around tile in such manner that every tile is crossed at least once by a wire. If iron or steel wire is used it shall be galvanized and no wire used shall be less than number twelve gauge.

(b) In places where there is trucking or wheeling, or handling of packages of any kind, the lower five feet of every column incased with hollow tile shall be incased in a protective covering of No. 16 U. S. gauge steel embedded in concrete.

841. Concrete—Approved Cement—When Fireproof.) (a) All approved cement concrete shall consist of a standard Portland cement, torpedo sand, and crushed stone or gravel, or crushed blast furnace slag, or crushed burnt clay, the volumetric quantity of all materials except the Portland cement shall not exceed eight times the volume of the Portland cement. All of the ingredients of cement concrete shall be thoroughly worked and wet so as to cover each piece of stone or gravel or slag or burnt clay with moistened cement; and the cement and sand shall fill the voids between the coarse material of the cement concrete.

(b) Cement concrete to be considered a fireproof material shall comply with the provisions of Section 776 and shall be cast and worked in an unset condition against the metal. In all cases where cinder concrete is used, the metal shall be protected as required by Section 780 of this Chapter.

842. Concrete Ingredients.) (a) The separate ingredients of concrete shall be measured for each batch, and shall be thoroughly mixed and must be uniform in color, appearance and consistency before placing. The concrete shall be worked continuously with suitable tools, as it is put in place, filling the forms completely.

(b) The sand to be used for concrete shall be clean coarse sand, free from loam or dirt. If crushed stone grit is used it shall be clean, gritty, and free from dust.

(c) The stone to be used in concrete shall be clean crushed hard stone, or clean crushed blast furnace slag, or gravel, and of a size to pass through a 1½-inch square mesh. If limestone or slag is used, it shall be screened to remove all dust; if gravel is used, it shall be thoroughly washed. Stone shall be drenched immediately before using.

(d) In all cases, the brick or hollow tile, solid tile, or terra cotta shall be bedded in cement mortar close up to the iron or steel member and all joints shall be made full and solid.

843. Pipes Enclosed by Covering.) (a) Pipes shall not be enclosed in the fireproofing of columns or in the fireproofing of other structural members of any fireproof building; provided, however, gas or electric light conduits not exceeding one inch diameter may be inserted in the outer three-fourths inch of the fireproofing of such structural member, where such fireproofing is entirely composed of concrete.

(b) Pipes or conduits may rest upon the tops of the steel floor beams or girders, provided they are imbedded in cinder concrete to which slaked lime equal to five per cent of the volume of concrete has been added before mixing or their being imbedded in stone concrete.

844. Shafts—Doors—Frames—Enclosure.) (a) In cases where a pipe, conduit, dumb waiter, cable wire, conveyor, belt, or any combination thereof, passes from one story to another story through an open hatch or floor opening, a shaft or enclosure of fireproof material shall be built from floor to floor around such hatch or floor opening in each story above and below such hatch or floor opening in the same manner as described for fireproof partitions in this chapter, and no wood shall be used in the construction, support or fittings of such shaft. The area of space thus enclosed shall not exceed the area of the floor opening by more than one hundred per cent.

(b) All burnt clay or terra cotta partitions or walls around such shafts shall be plastered on the outside and plastered or pointed on the inside.

(c) All doors, frames, sashes, casings and windows in partitions or walls around such floor openings, shall be built of incombustible material. The supports of such doors, frames, sashes, casings and windows shall also be of incombustible material. In the case of doors, such supports shall be of rolled structural metal extending from floor to ceiling and secured to both. Where there are brick walls of twelve inches or more in thickness, the supports need not extend to ceiling as above specified. All glass used in connection with such partitions or walls shall be wired glass.

(d) Such fireproof enclosures may be omitted if all of the space in each floor opening not occupied by pipes, conduits, cables, wires, or any combination thereof, are filled in solid fireproof material not less than eight inches thick.

845. Spandrel Beams, Girders, Lintel.) The metal of the exterior side of the spandrel beams or spandrel girders of exterior walls, or lintels of exterior walls, which support a part of exterior walls, shall be covered in the same manner, and with the same material as specified for the exterior columns in this chapter; provided, however, that shelf angles connected to girders by brackets or projections of girder flanges not figured as part of the flange section, may come within two inches of the face of the brick or other covering of such spandrel beams, girders or lintels. The covering thickness shall be measured from the extreme projection of the metal in every case

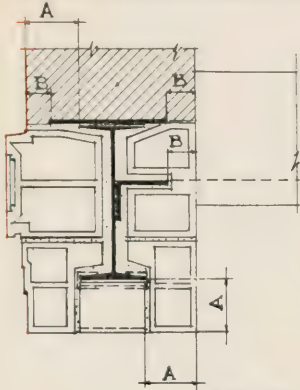


Fig. 45.

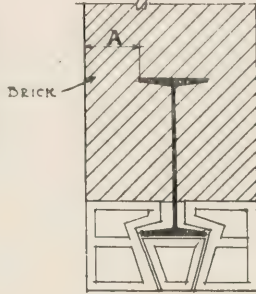


Fig. 46.

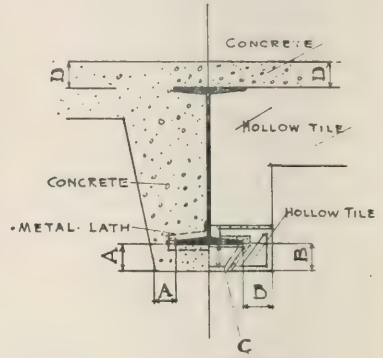


Fig. 47.

PROTECTION OF BEAMS.

Section 845, 846.

(A) Fire-proof covering for beams, girders, etc., for exterior structural parts, Sec. 845. See provisions for columns (Sec. 838) for A.

Fig. 45. (B) Allowable covering for shelf angles, etc., not figured part of flange section to be 2".

Figs. 45, 46, 47. Necessary fire-proof covering for beams, girders, etc., for interior structural parts (Sec. 618).

hollow tiles or if of solid porous tiles, or if of terra cotta, such tiles shall be not less than two inches thick, applied to the metal in a bed of cement mortar; hollow tiles shall be constructed in such a manner that there shall be one air space of at least three-fourths of an inch by the width of the metal surface to be covered within such clay coverings the minimum thickness of concrete on the bottom and sides of metal shall be two inches.

(c) The top of all beams, girders, and trusses, shall be protected with not less than two inches of concrete or one inch of burnt clay bedded solid on the metal in cement mortar.

Fig. 46. (A) 4" for brick (Sec. 846b).

Fig. 47. (B) 2" for hollow tile or solid tile (Sec. 618b).

(A) 2" for concrete (Sec. 846b).

(C) $\frac{3}{4}$ " air space by width of metal surface to be covered as required (Sec. 846b).

(D) Concrete covering for tops of beams, girders, etc., to be 2" (Sec. 846c).

846. Beams, Girders and Trusses—Coverings of.) (a) The metal beams, girders and trusses of the interior structural parts of a building shall be covered by one of the fireproof materials hereinbefore specified so applied as to be supported entirely by the beam or girder protected, and shall be held in place by the support of the flanges of such beams or girders and by the cement mortar used in setting.

(b) If the covering is of brick, it shall be not less than four inches thick; if of

(d) In all cases of beams, girders or trusses, in roofs or floors, the protection of the bottom flanges of the beams and girders and so much of the web of the same as is not covered by the arches shall be made as hereinbefore specified for the covering of beams and girders. In every case the thickness of the covering shall be measured from the extreme projection of the metal, and the entire space or spaces between the covering and the metal shall be filled solid with one of the fireproof materials, excepting the air spaces in hollow tile.

(e) Provided, however, that all girders or trusses when supporting loads from more than one story shall be fireproofed with two thicknesses of fireproof material or a combination of two fireproof materials as required for interior columns in Section 839 of this chapter, and each covering of fireproof material shall be bedded solid in cement mortar.

(f) The fireproofing herein required for metal structural roof members may be omitted in buildings used exclusively for purposes of Class IV and of Class V, when such structural roof members support only roof loads and ceiling construction over interior open spaces under the following conditions. A continuous ceiling of incombustible material shall be suspended below the roof from the structural roof members. There shall be no openings in ceilings other than those required for ventilation. Where the plane of the ceiling is twenty feet or more above the floor of the open space, all structural mem-

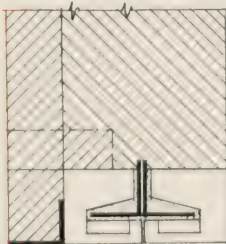


Fig. 48.

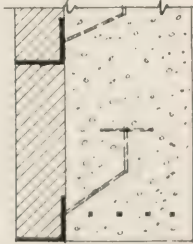


Fig. 49.

Where lintels are fireproofed previously and independently, the Commissioner of Buildings has ruled that the application of the architectural facing may be supported as shown (Fig. 48, 49).

The ruling is only applied to openings not to exceed four feet in width, and the maximum depth of the beam is not to exceed eighteen inches.

bers or parts thereof projecting below said ceiling shall be fireproofed as required by the provisions of this Chapter. The fireproofing to extend upward two inches above the ceiling level. Where the plane of the ceiling is nearer than twenty feet to the floor of the open space all structural members above or below such ceiling to the height of twenty feet above the highest point of the floor of the open space shall be fireproofed as required by the provisions of this Chapter. Openings in ceilings for ventilation shall be connected by a conduit or duct to the outside of the building. Ducts shall be of metal or other incombustible material and if of metal where such ducts have an area greater than 400 square inches same shall be constructed double with an intervening air space.

847. Fireproofing of Exterior Sides of Mullions.) In buildings required by this chapter to be of fireproof construction or exposures where metal frames, doors, sash and wired glass are not required, all vertical door or window mullions over eight inches wide shall be faced with incombustible material, and horizontal transom bars over six inches wide shall be faced with a fireproof or with an incombustible material.

848. Fireproof Covering, Independent.) The fireproof covering of brick, concrete, burnt clay tiles, hollow terra cotta or of a combination of any two of these materials shall be applied to all of the structural members of the exterior of a fireproof building previous to and independent of the application of the architectural facing of such fireproof building with an incombustible or fireproof material.

849. Walls, Support and Fireproofing of.) Where skeleton construction is used for the whole or part of a building the enveloping material and the walls shall be independently supported on the skeleton frame for each individual story.

850. Iron or Steel Plates for Support of Wall.) Where iron or steel plates or angles are used in each story for the support of the facings of the walls of such story, such plates or angles shall be of sufficient strength to carry the weight within the limits of fibre stress for iron and steel elsewhere specified in this chapter of the enveloping material for such story, and such plates or angles may extend to within two inches of the exterior of such covering.

851. Cut-out Boxes, Chases, Etc.—Fireproof Covering.) No electric service cut-out box, switch box, cabinet, chase or any other recess, shall encroach on the minimum thickness required for any fireproof covering on structural metal, except as provided in this chapter. If the depth of any cut-out box, switch box, cabinet, or chase, or if any other recess is to be concealed, or partially concealed, then the thickness of the fireproof covering shall be increased correspondingly.

852. Segmental and Flat Arches.) (a) Segmental arches shall have a rise of at least one inch for each foot of span of arch.

(b) The least thickness of a hollow tile or porous terra cotta segmental arch shall be one-half of an inch per foot of span, but no such hollow tile or terra cotta arch shall be of a thickness less than five inches.

(c) Both flat and segmental arches shall be so constructed that the joints of the same radiate from a common center and there shall be a cross rib for every four inches, or fractional part thereof, in height in each tile block. The skewback of the arches shall be carefully fitted to the beams supporting them, and, in addition to the cross ribs, there shall be additional diagonal re-enforcing ribs in the skewback. Such arches, whether flat or curved, shall have their beds well filled with cement mortar, and the

centers shall not be struck until the mortar has set.

(d) Burnt clay skewbacks shall be molded in such a manner as to support the burnt clay covering on the under sides of beams or girders.

853. Fireproof Floor and Roof Construction.) Brick, hollow tile, porous terra cotta, or approved cement concrete, or approved cinder concrete, shall be used for the construction of floor and roofs of fireproof buildings. Flat arch hollow tile, or flat arch porous clay tile floor arches shall have a height of at least one and one-half inches for each foot of span.

854. Wood Flooring and Nailing Strips.) (a) Wood flooring and wooden nailing strips for such flooring may be used in fireproof buildings.

(b) Where such flooring is used in a fireproof building, the space immediately under the flooring, and between the nailing strips and under such nailing strips, shall be filled with a cement or a cinder concrete tamped into place in an unset state, or with such other incombustible material as shall be approved by the Commissioner of Buildings.

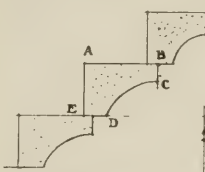


Fig. 50.

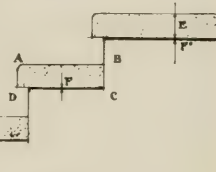


Fig. 51.

Section 854c.

Fig. 50. Area of cross section A B C D E shall not be less than 60 sq. inches.

Section 854d.

Fig. 51. If area of cross section (A B C D) is less than 60 sq. inches or (E) (thickness of platform) less than 7 in., then metal sub-tread F and sub-platform F' ($\approx 3/32$ in. thickness) is required. Section 854e gives exception to above.

855. Partitions in Fireproof Buildings.) (a) Where stairs, shafts and elevators are enclosed they shall be enclosed in fireproof partitions, as described in Section 856 of this chapter; all other partitions, shall be incombustible partitions. Where blocks are used for building partitions, the joints shall be well filled with mortar.

(b) The partitions shall be wedged tight between floor and ceilings with incombustible wedges.

856. Partitions — Fireproof — Incombustible.) (a) Only fireproof material shall be used for fireproof partitions; if of brick, they shall be not less than four inches thick, and if of partition blocks, not less than three inches thick. If fireproof partitions are of reinforced concrete they shall be not less than three inches thick.

(b) All fireproof partitions required by this ordinance shall be supported directly on the steel construction, or on the fireproof floor arches, or on concrete, or on brick.

(c) Only fireproof or incombustible material shall be used in the construction of partitions not required to be fireproof, excepting that frames, casings, doors, sash and the rough carpenter work required for the proper fastenings of such frames, casings, doors or sash, may be of wood, and that ordinary glass may be used in doors and partition windows.

(d) All corridor partitions of incombustible or fireproof material in fireproof buildings, shall be supported directly on the steel construction, on the fireproof floor arches, on concrete or on brick.

857. Stairs—Landings.) (a) Stairs in fireproof buildings shall be built of approved cement concrete, reinforced concrete, stone or metal, or a combination of one or more of such materials.

(b) The handrails of such stairways may be of wood.

(c) If stairs are constructed of solid stone or plain concrete, having the tread and riser in one piece, then there shall be not less than sixty square inches of stone or concrete in the cross section of such combined tread and riser.

(d) If stone treads have less than sixty inches of cross section and platforms less than seven inches in thickness are used, they shall have a metal sub-tread and sub-platform three thirty-seconds of an inch thick.

(e) If platforms have a floor arch sub-construction as described in Section 852 and 853 of this chapter, then the metal sub-platform may be omitted.

858. Roofs—Rise of Roof Above Limit of Height.) In the case of buildings which are fireproof in their construction, the roof may rise above the limit of height of wall fixed by this chapter for such buildings at a slope not to exceed thirty degrees with the horizon, and to a height not exceeding twenty feet above such limitation of the height of the wall. The space enclosed by such roof above the limitation of the height of such wall may be used as an inclosure for pipes, ventilating or elevator machinery or for ventilating ducts, but it shall not be lawful to use such space for purposes of storage, business or residence.

859. Sheet Metal Work—Support Of.) Wood shall not be used as the support of any sheet metal work or of any gutter or cornice of a building more than fifty feet in height.

ARTICLE XV.

Slow Burning Construction.

860. Slow-Burning Construction Defined.) The term "Slow-Burning Construction" shall apply to all buildings in which the structural members, other than walls elsewhere required to be of masonry, which carry the loads and strains which come upon the floor and roofs thereof are made wholly or in part of combustible material, but throughout which the structural metallic members, if used, are fireproofed as required for fireproof construction. Where metallic lintels are used to cover wall openings the fireproofing on the underside may be omitted where such lintels are fireproofed on the other three sides and all voids in them are filled solid with fireproof material. The lower five feet of metal columns shall be protected as required in Section 848 of this Chapter. Underside of joists shall be protected by a covering of three coats of plaster laid on metal lath; and a layer of mortar or other incombustible material at least one and one-half inches thick shall be applied on all floors and roof surfaces above the joists of same.

The fireproofing herein required for metal structural roof members may be omitted in any building of slow-burning construction used exclusively for purposes of Class IV of seating capacity less than one thousand persons or in any building of slow-burning construction used for purposes of Class IV in combination with any other Class where such part of such building as is used for purposes of Class IV has a seating capacity of less than one thousand persons and is separated from all other parts of such building by brick walls of thickness required in this Chapter and also by floors of fireproof construction, when such structural roof members support only roof loads and ceiling construction over interior open spaces under the following conditions. A continuous ceiling of incombustible material shall be suspended below the roof from the

structural roof members. There shall be no openings in ceiling other than those required for ventilation. Where the plane of the ceiling is thirty feet or more above the floor of the open space all structural members or parts thereof projecting below said ceiling shall be fireproofed as required by the provisions of this Chapter, the fireproofing to extend upward two inches above the ceiling level. Where the plane of the ceiling is nearer than thirty feet to the floor of the open space all structural members above or below such ceiling to the height of thirty feet above the highest point of the floor of the open space shall be fireproofed as required by the provisions of this Chapter. Openings in ceiling for ventilation shall be connected by a conduit or duct to the outside of the buildings. Ducts shall be of metal or other incombustible material, and if of metal where such ducts have an area greater than 400 square inches same shall be constructed double with an intervening air space. The floor levels of balconies and galleries having a gross area of less than fifteen per cent (15%) of the gross area of the floor of such open space shall not be used as a basis for calculating the height of such fireproofing.

861. Posts, Girders and Partitions.) Wood posts, if used, shall be of not less than one hundred square inches sectional area. Wood girders, if used, shall be of not less than seventy-two square inches sectional area. All partitions in buildings of this type shall be made entirely of incombustible material. Wood furring, wood studs and wood lath shall not be permitted in buildings of this type.

862. Stair, Construction of.) Where buildings are required to be of "slow burning" construction, all stairs in such building shall be of incombustible material, except as hereinafter provided. Said stairs may be of ordinary construction, if said building is equipped with an automatic sprinkler system, and stairs are enclosed in a fireproof wall.

ARTICLE XVI.

Mill Construction.

863. Definition—Mill Construction Requirements.) The term "Mill Construction" shall apply to all buildings in which wooden posts, if used, have a sectional area of not less than one hundred square inches, and wooden girders and joists a sectional area of not less than seventy-two square inches, and roofs, if of wood, a thickness of not less than two and five-eighths inches in a single layer, except where the building is equipped throughout with a sprinkler system, subject to the approval of the Chief Fire Prevention Engineer, in which event such layer may be not less than one and five-eighths inches thick, and floors, if of wood, a thickness of not less than three and one-half inches in not more than two layers, the lower one of which shall be not less than two and five-eighths inches in thickness, and in which all structural metallic members, if used, are fireproofed as required for fireproof construction. Where metallic lintels are used to cover wall openings the fireproofing on the underside may be omitted in case such lintels are fireproofed on the other three sides and all voids in them are filled solid with fireproof material. All floors and roofs not constructed as above shall be of fireproof construction as elsewhere required for fireproof construction in this chapter.

864. Fireproofing.) (a) Partitions in buildings of mill construction shall be made entirely of incombustible material. If iron columns, girders, or beams are used in buildings of this type they shall be protected as specified in this Chapter; but the wooden posts, girders and joists need not be protected by fireproof covering. Wood

furring, wood studs and wood lath shall not be permitted in buildings of this type.

(b) If reinforced cinder concrete construction is used in the structural parts of a building which is required to be of slow-burning or mill construction by this chapter, then all partitions shall be of incombustible material and all parts other than structural parts and partitions of the building shall be as required for slow-burning or mill construction buildings by this chapter.

865. **Stair Construction Where Automatic Sprinkler System is Installed.)** In buildings required to be of "mill construction," all stairs in such buildings shall be of "incombustible" material, except as hereinafter provided. Said stairs may be of wood construction if said building is equipped with an automatic sprinkler system and stairs are enclosed in a fireproof wall.

ARTICLE XVII.

Ordinary Construction.

866. **Ordinary Construction Defined.)** The term "ordinary construction" as used in this chapter, means the ordinary system of construction in which timber and iron structural parts are not protected with fire-resisting coverings and in which the walls are of masonry built as required by this chapter.

ARTICLE XVIII

Frame Buildings.

867. **Repairing of Frame Buildings Within Fire Limits.)** Frame buildings within the fire limits which have been damaged by fire, decay or otherwise, to an extent not greater than fifty per cent of their value may be repaired, provided there is no increase in size of such buildings over their original dimensions, and, provided that incombustible roof covering required by Section 811 is used. And, provided, further, that where any frame building is raised for the purpose of erecting a basement story under the same, the walls enclosing such basement shall be of masonry.

868. **Frame Buildings Prohibited—Exceptions.)** (a) Hereafter no frame building shall be erected, nor any frame addition made to an existing frame building within the fire limits of the city, except where express provision is made in this chapter therefor.

(b) Outside the fire limits it shall be lawful to erect frame buildings not exceeding forty feet in height from the sidewalk to the highest point of roof. If such frame buildings have a basement story of masonry, their height above the sidewalk may be made not to exceed forty-five feet. Provided, however, that in no case shall any portion of any frame building above the second floor be used as a separate living apartment.

(c) It shall be lawful to surround frame buildings with a veneer of brick not less than four inches in thickness, provided the said brick is not carried higher than the second story, or twenty-two feet above the basement ceiling; and provided further that the said veneer is anchored to the studding or other frame construction in a manner satisfactory to the Commissioner of Buildings. Such brick veneer is not to be placed on gables or any other parts of frame buildings above the height herein specified. All frame buildings which it is desired to surround with brick veneer must have their basement walls and foundations of solid masonry, as provided in Section 872.

869. **Frame Buildings Within the Fire Limits Changed Into Flat Buildings—Fire Walls.)** Whenever any frame building within the fire limits shall be remodeled, altered or charged for the purpose of using the same for flats or apartments, or whenever such frame building shall be occupied for

flat or apartment purposes, each suite of apartments in such building shall be separated from every other suite of apartments in such building by a wall of incombustible material, of such dimensions and thickness as required by this chapter.

870. **Frame Buildings—Raising—Requirements—Changing Gable or Hip Roofs to Flat Roofs.)** Permission may be granted by the Commissioner of Buildings for the raising of existing frame buildings, whether within or without the fire limits, to the limits of height hereinbefore fixed for new frame buildings, and no more, and inside the fire limits for the purpose of putting a masonry basement thereunder. The Commissioner of Buildings is also authorized to issue permits for changing gable or hip roofs of existing frame buildings to flat roofs, and for the raising of walls incident to such change. But if such hip or gable roof is changed to a flat roof and the walls raised in connection with such change, the total cubic contents included by the walls so raised and the roofs so altered shall not exceed the cubic contents originally included in such gable or hip roof, and in no case shall a two-story and attic building be converted into a three-story building thereby.

871. **Frame Buildings Carried to a Uniform Height.)** Where the different parts of a frame building inside the fire limits are of different heights a one-story portion may be raised to the height of two stories, provided the greatest height thereof does not exceed the limits of height prescribed in this chapter for frame buildings and provided, that no room in the existing building or in the addition thereto shall violate the requirements of this chapter for habitable rooms.

872. **Basement or Story Placed Beneath Frame Buildings.)** A frame building may be raised for the purpose of erecting a basement or story, or both, thereunder, but the principal floor of such frame building shall not be raised to a higher level than 16 feet above the grade of the sidewalk upon which such premises abut. Where a building so raised is one story in height only and the same is raised so as to permit a basement under the same not to exceed six feet six inches in height from the basement floor to the ceiling of said basement, the said house may be placed upon cedar posts. In all other cases the walls enclosing such basement or story shall be of masonry and not less than 12 inches thick except where a one-story frame building is raised and has a basement only built thereunder, the masonry walls of such basement may be eight inches thick above grade and 12 inches thick below. The foundation of such wall shall be constructed as provided in this chapter; provided, however, that no frame building shall be raised for the purpose of constructing a basement or story, or both, under the same to a greater height to the top of its roof than that elsewhere herein given as the maximum height above grade for frame buildings. The thickness of walls hereinbefore required shall also apply to brick walls in new frame buildings.

873. **Chimneys in Frame Buildings—Chimney Flues Through Partitions.)** Chimneys in frame buildings shall be built as required by Section 800 of this chapter. The wood framing of frame buildings shall be trimmed around chimneys in such a manner as not to come within two inches of same.

874. **Lot Lines—Requirements as to Number—Dimensions.)** Frame buildings, excepting sheds not exceeding three hundred square feet in area and not exceeding fourteen ft. in height from the ground, shall not be built nearer than one foot to any line of the lot upon which they are built, street and alley lines excepted, except as hereinafter

provided. It shall not be lawful to erect a frame building wider than forty feet nor deeper than seventy feet, unless such building be divided by a fire wall or fire walls, built of incombustible material and of a thickness of not less than four inches and of construction to be approved by the Commissioner of Buildings, so that no more than two thousand eight hundred square feet of superficial area shall be contained in any section or part of such building, uninclosed by such fire walls, and if openings are inserted in such fire walls, then such walls shall be built of brick not less than eight inches thick, and such openings shall have doors as described in Section 789. Each section of such buildings shall be regarded as a separate building for the purpose of determining the number and construction of its stairways and means of egress. If more than one frame building is built in the direction of the depth of any one lot, such buildings shall not be built with a less distance than ten feet between them except where both buildings are used for living purposes, and in that case the distance shall be governed by Sections 641 and 642 of this chapter.

Note: See also Sec. 488 (b) as to distance between lot and building lines (Class III).

875. Sheds—Open Shelter—Height of Walls and Foundations—Enclosed.) (a) Except as hereinafter provided, open shelter sheds not exceeding eight hundred square feet in area may be erected within the fire limits, provided they have roofing of incombustible material and the highest point is not over fifteen feet above the ground, and provided that the roofs be supported on sufficient posts or piers; provided further, however, that such sheds may be built with an area not to exceed sixteen hundred square feet, if they are kept at least twenty-five feet from any lot line and any other building or structure. Such sheds shall have no combustible enclosing walls or wooden floors, except that a floor of two-inch planking laid directly upon the ground may be used. Such sheds shall only be erected upon the rear of the lot, and not more than one such shelter shed or any other shed shall be erected on any lot of twenty-five feet in width.

(b) If it is desired to enclose an open shelter shed, the enclosing walls shall be made of brick, hollow tile, or other incombustible material, and such walls shall have foundations extending to solid ground and at least four feet below the surface of the ground.

(c) Open shelter sheds may be erected outside the fire limits not to exceed twenty-eight hundred square feet in area and subject to the approval of the Commissioner of Buildings; provided, however, that shelter sheds which comply in other respects with the requirements of this section, may be built not to exceed nine thousand square feet in area where such sheds are located at least twenty feet distant from any other structure and from any lot line.

(d) It shall be lawful to erect inclosed wooden shelter sheds at any fire department station in the city for the storage of fuel and supply wagons. Such sheds shall not exceed twenty-five feet in width, thirty feet in length and fourteen feet in height.

(e) Sheds not exceeding fourteen feet in height from the ground to the highest point thereof, and not exceeding three hundred square feet in area, with an incombustible roof, may be constructed of wood within the fire limits. Such sheds shall not be located on the front part of any lot, nor shall they be used as a dwelling or as an addition to a dwelling house, or for any business purpose whatever, nor shall more than one shed be erected on any one building lot of twenty-five feet in width.

(f) Frame auto-sheds housing not to exceed two automobiles or auto cars may be erected inside the fire limits of area not to exceed 400 square feet. Such auto-sheds shall have an incombustible roof and shall have a concrete floor not less than 4 inches thick laid directly upon the ground. At the time of applying for a permit for such auto-shed, applicant shall submit a plat of the lot showing the location of same made by a licensed surveyor and giving the established grade of the alley upon which such auto-shed shall open. Such shed shall not exceed 14 feet in height and shall be situated on the rear or the lot; shall be used for the purpose of housing automobiles only and there shall not be more than one such shed on any lot or premises.

876. Sheds—Coal, Brick, Stone, Cement and Salt Sheds and Sheds for Icing Cars Along Railroad Tracks and Navigable Stream Frontage Consents.) Open shelter sheds to be used for the storage or handling of coal, brick, stone, cement, salt or such commodities which are incombustible, or for the icing of cars, may be erected within or without the fire limits upon, along or adjacent to steam railroad tracks, or along or adjacent to navigable waters; provided, such sheds shall have incombustible roofing and shall not exceed 35 feet in height from the ground to the highest point of the roof; provided, further, that said sheds shall be located at least 25 feet distant from any other structure and from any side lot line. If it is desired or intended to enclose any such sheds, the enclosing walls shall be of incombustible material. No such shed shall be built upon any lot or parcel of ground fronting upon any street within 200 feet of any building used exclusively for residence purposes, unless the consent of the owners of the majority of the frontage on both sides of such street between the two nearest intersecting cross streets shall first have been obtained by the person, firm, or corporation desiring to erect and maintain such shed, and said written consents shall be filed with the Commissioner of Buildings before a permit shall be issued for such shed.

877. Ice Houses.) (a) Houses within the fire limits to be used exclusively for the storage of ice, not exceeding forty-five feet in height, and of a floor area not exceeding 9,000 square feet, may be constructed of wood with incombustible roofing, the walls to be enclosed with an envelope of incombustible material; eight-inch walls of brick or tile or approved cement concrete with proper foundations of masonry shall be used for such envelopes.

(b) Houses to be used exclusively for the storage of ice, located outside of the fire limits and contiguous to any lake and six hundred feet from any other building, except buildings used in connection with the conduct of said business, may be constructed of frame with incombustible roofing, and the floor area of any such building shall not exceed eighty thousand square feet, unless the building is divided by a solid wall of masonry for each additional 80,000 square feet of floor area, or fractional part thereof; and shall extend at each end not less than one foot beyond the enclosure of said building and such wall shall be subject to the approval of the Commissioner of Buildings.

(c) Houses to be used exclusively for the storage of ice, located outside of the fire limits, and contiguous to railroad tracks and not within one hundred feet of any other building, may be constructed of frame with incombustible roofing, and the floor area of any such building shall not exceed 20,000 square feet unless the building is divided by a solid wall of masonry for each additional 20,000 square feet of floor area or fractional part thereof; said wall shall extend at least one foot beyond the enclosure of said

building on each end and shall be approved by the Department of Buildings.

(d) All dividing walls must extend through and above the roof of any building in which they are built to a distance of three feet and must be covered with incombustible coping. No dividing wall shall be of less thickness than twelve inches at any point thereof.

ARTICLE XIX.

Stairways.

878. **Stairways, Number—Location—Construction.** (a) Fireproof office buildings existing at the time of the passage of this ordinance which are equipped either with one stairway and two or more stairway fire escapes or with two stairways and one or more stairway fire escapes, shall not be required to have additional stairways or stairway fire escapes.

(b) Except as otherwise expressly provided in this Article, it shall be unlawful to construct or maintain any building or structure of Classes I, II and VII unless its stairway or stairways comply with the following provisions:

(c) In every existing building of ordinary construction having an area greater than 9,000 square feet or of mill or slow-burning construction greater than 12,000 square feet, there shall be not less than three stairways. The width of stairs shall be at least eighty per cent of the width of stairs as computed by the formulae given herein and in no case less than twelve feet.

(d) Every building shall have at least one stairway from the ground to the top floor and one stairway from the lowest basement or cellar to the street grade, and no stairway shall be less than three feet in width.

(e) The width of stairs required for a building shall be construed as the total width of all stairways required on the building. Stairs shall be measured between the wall and handrail for a single stair and between handrails where two or more handrails are required by this chapter.

The aggregate width of door openings at, or approximately at the street level in buildings of all classes shall be equal to the aggregate width of stairways as specified in this article. The use of revolving doors shall not be permitted in any building of Class IIc or of Classes III, IV, V, VIII or IX.

(f) In buildings of Class I and Class IIa the width of stairs and fire escapes required for a building shall be determined by the floor area measured on the third floor of the building and such area shall not include walls, columns, stairs, elevator shafts, well holes, chimneys and corridors. In all cases where the building is less than three stories in height the width of stairs shall be determined by the floor area of the second floor as hereinafter specified.

(g) Where the enclosed space between a ceiling and the roof of a building of any Class is of greater average height than two feet in the clear, access shall be provided by means of at least one stairway not less than three feet wide leading from a public hallway or corridor.

(See Illustration, Sec. 613).

879. **Stairs—Number and Width of in Classes I, II and VII.** (a) In buildings of Class IIb, Class IIc and Class VII the number and width of the stairs and fire escapes shall be determined by the area of that portion of the third floor not occupied by walls, columns, stairs, elevator shafts and well-holes.

In buildings of Class I, II and VII the number and width of stairs required shall be as follows:

(b) IN ORDINARY CONSTRUCTION.

With floor area of 5,000 square feet or less, two stairways;

With floor area of 5,000 to 9,000 square feet, three stairways.

Provided, however, that in buildings of ordinary construction, existing prior to December 5, 1910, with floor area of 5,000 square feet or less, one stairway only shall be required where the building is also equipped with an outside stairway fire escape, and in all such buildings with floor area of from 5,000 to 9,000 square feet, two stairways only shall be required; in case such building is also equipped with an outside stairway fire escape. Where such buildings are equipped with ladder fire escapes, erected in compliance with the ordinance now in force, one-half the width of such ladder fire escape shall be credited in computing the width of stairs required therein.

(c) The width of stairs required in buildings of ordinary construction shall be computed as follows:

The width of stairs in inches shall be equal to the result obtained by deducting 3,000 from the floor area of the building in square feet and multiplying the remainder by twelve and dividing the product by 1,000 and adding 72 inches to the quotient, expressed in the formula as follows:

$$\begin{array}{r} \text{(area—3,000) times 12} \\ 72 \text{ inches plus} \hline 1,000 \end{array}$$

(d) IN MILL OR SLOW-BURNING CONSTRUCTION.

With floor area of 6,000 square feet or less, two stairways.

With floor area of 6,000 to 12,000 square feet, three stairways.

(e) The width of stairs required in buildings of mill or slow-burning construction shall be computed as follows:

The width of stairs in inches shall be equal to the result obtained by deducting 3,000 from the floor area of the building in square feet and multiplying the remainder by eight and dividing the product by 1,000 and adding 72 inches to the quotient; expressed in the formula as follows:

$$\begin{array}{r} \text{(area—3,000) times 8} \\ 72 \text{ inches plus} \hline 1,000 \end{array}$$

(f) IN FIREPROOF CONSTRUCTION.

With floor area of 7,000 square feet or less, two stairways.

With floor area of 7,000 to 15,000 square feet, three stairways.

With floor area of 15,000 to 21,000 square feet, four stairways.

With floor area of 21,000 square feet and over, five stairways.

(g) Provided, however, that in fireproof buildings having an area of 21,000 square feet or more only four stairways shall be required if such building is completely equipped with an approved automatic sprinkler system.

(h) The width of stairs required in buildings of fireproof construction shall be computed as follows:

The width of stairs in inches shall be equal to the result obtained by deducting 3,000 from the floor area of the building in square feet and multiplying the remainder by six and dividing the product by 1,000, and adding 72 inches to the quotient; expressed in the formula as follows:

$$\begin{array}{r} \text{(area—3,000) times 6} \\ 72 \text{ inches plus} \hline 1,000 \end{array}$$

(i) Provided, however, that where buildings of Class I are of fireproof construction and are used solely for storage warehouse purposes and the number of persons employed on any one floor does not exceed the number specified hereafter in this sec-

tion they shall comply as to number of stairways as follows:

With floor area less than 8,000 square feet where not more than ten persons are employed on a floor, two stairways.

With floor area greater than 8,000 square feet and less than 15,000 square feet where not more than fifteen persons are employed on a floor, three stairways.

With floor area greater than 15,000 square feet where not more than twenty persons are employed on a floor, four stairways.

(j) The width of stairs shall be computed as follows:

The width of stairs in inches shall be equal to the result obtained by deducting 3,000 from the floor area of the building in square feet and multiplying the remainder by four and dividing the product by 1,000, and adding 72 inches to the quotient; expressed in the formula as follows:

$$72 \text{ inches plus } \frac{(\text{area} - 3,000) \text{ times } 4}{1000}$$

(k) Provided, however, where buildings of Class I are used solely for storage or warehouse purposes and the number of persons regularly employed above the floor nearest the street level does not exceed ten persons or where the number of persons occasionally employed above the floor nearest the street level does not exceed twenty persons, the floor area of such building may be increased fifty per cent (50%) in excess of the area limits as provided in this Section for buildings of Class I of ordinary, slow-burning mill or fireproof construction for the given number of stairways. The width of such stairways shall be as determined by use of formula given for each separate type of construction, by using two-thirds of the actual floor area of such building as a basis for the calculation, and by substituting the words and figures, "54 inches," for the words and figures, "72 inches," where they occur in said formula. There shall be not less than two stairways, or one stairway and a stairway fire escape directly accessible from each area of such building, and the location of all stairways and fire escapes shall be subject to the approval of the Commissioner of Buildings. The minimum width of any stairway in such buildings now in existence shall be not less than thirty inches (30"), the minimum width of any stairway in such buildings hereafter erected or hereafter converted to such use shall be not less than thirty-six inches (36"), and the minimum width of any fire escapes shall be not less than twenty-four inches (24").

880. Stairs—Handrails—Other Requirements. (a) The width of stairway fire escapes and three-quarters of the width of sliding fire escapes required by this chapter may be deducted from the width of stairs required.

(b) Stairways shall be located as far from each other as practicable. The bottom of each stairway shall be in the immediate vicinity of the top of the stairs leading to the next lower story and the line of travel from stairway to stairway shall be direct and easily accessible each to the other. At least one stairway shall extend to the roof of every building. In Classes I, II and VII, the whole number of stairways required for each building shall be complete in every respect from the first to the topmost story.

(c) Every story below the street grade shall have not less than two stairways to the first story and each such stairway shall be not less than three feet wide, but where a basement or cellar is used for the retail sale of goods the stairway from such basement or cellar shall in number and aggregate width comply with the requirement of this section for the first four stories above sidewalk grade.

(d) Where two areas of the same building adjoin and are separated by fireproof dividing walls they may have a stairway in common, provided such stairway is not less than five feet wide and is inclosed in all stories of the building by fireproof walls in non-fireproof buildings and by fireproof partitions in fireproof buildings; and where the stairways and landings are built as required by this chapter for buildings of fireproof construction, and where the doors, frames, sashes and casings, and the glazed portion thereof are built as described in Section 784 and 789 then in such case such stairway may be considered as equivalent to one open stairway from each such area, and where such stairway provides exit from only one floor area such stairway may be considered as equivalent to two open stairways but in no case shall there be less than two stairways in any such building except as otherwise provided in this chapter.

(e) Where adjoining buildings or buildings on opposite sides of an alley or other open space, and of the same class, used by the same person, firm or corporation, are connected by fireproof bridges or passageways with fireproof doors at each end, or by fireproof doors on each floor built and equipped as required by this chapter for dividing wall doors if such bridge or passageway or fireproof door is located as far as practicable from the stairways in both said buildings, then said bridge or passageway or fireproof door may be considered to be equivalent to a stairway for each of the two areas.

(f) In buildings of Classes I, II and VII, where an interior stairway is enclosed in a tower and built as required by the provisions of Section 881 paragraph (n) of this Chapter, then such stairway shall be considered the equivalent of two stairways, or a stairway and a fire escape; provided, however, that if such stairway is considered the equivalent of two stairways the building must be equipped with a stairway fire escape, or fire escapes, as is required by this Chapter.

(g) Exterior stairways in buildings of Class I, II and VII built entirely of steel and iron, having ice-proof treads not less than ten inches wide from nosing to riser and a rise of eight inches or less for each riser, and otherwise made as required for stairway fire escapes in this chapter and where such stairway fire escape extends from the inside grade to the top floor of the building or is supplied from the second floor to the ground with a counterbalanced section and has a steel ladder from the top landing to the roof, then such stairway may be considered the equivalent of one interior stairway and one stairway fire escape if the width of such stairway and that of the one or more stairways in the building equals the width of stairs required by this chapter; provided, that in such case the respective floors, door sills, and stairway platforms are flush, and that the doors do not obstruct the stairs or platforms and that the doors are each at least 90 per cent of the width of said stairway and that the windows, doors and frames passed by such stairway and platforms are built of incombustible material and wired glass.

(h) In buildings of Class I not more than three stories in height, a stairway fire escape not less than three feet wide located and built as required by this chapter for such fire escape and placed as far as practicable from the stairway, may be considered as a stairway and may be deducted from the "width of stairs" required for the building.

(i) The width of different stairways need not be alike, and for each four stories or fractional number of stories of the building above the first four stories each stair-

way may be reduced six inches, but no stair in a Class VII building shall be less than three feet in width.

(j) Stairways which are less than three feet three inches wide shall have not less than one hand rail and stairways which are more than three feet three inches wide shall have not less than two handrails. Stairways which are over eight feet wide shall have double intermediate handrails with end newel posts at least five and one-half feet high at all stair landings.

(k) Stairways hereafter erected shall not be spiral stairways or have any winders. Provided, however, that circular or elliptical stairways may be used if the width of treads one foot from the center of the handrail next to the well-hole is nine and one-half inches, including nosings.

(l) Stairways shall not have risers more than eight inches high nor treads less than ten inches wide, inclusive of nosings.

(m) The bottom of any counter-balance stairway or ladder fire escape hereafter erected on any public thoroughfare when raised shall be not less than fourteen feet above the pavement or surface of the street or alley.

(n) The location of every stairway required by this article shall be subject to the approval of the Commissioner of Buildings.

(See Illustration, Sec. 613).

ARTICLE XX.

Fire Escapes.

§ 881. Fire Escapes—Number and Location. (a) It shall be unlawful for any person, firm or corporation to construct or maintain any building of Classes I, II, III, VI, and VII within the city, unless the same shall be equipped with fire escapes as follows:

(b) Every building four or more stories in height, except such as is used exclusively for a residence for one family shall have one or more incombustible sliding or stairway fire escapes, as required by this chapter, except as otherwise herein provided.

(c) There shall be at least one stairway fire escape constructed as required by the provisions of this chapter for each 250 persons, or fractional part thereof, who occupy any floor of any building habitually and daily or for whom working, sleeping or living accommodations are provided on any one floor above the third floor of any building or structure.

(d) BUILDINGS OF ORDINARY CONSTRUCTION SHALL BE EQUIPPED WITH FIRE ESCAPES AS FOLLOWS:

With floor area of 6,500 square feet or less, one 24-inch stairway fire escape.

With floor area of 6,500 square feet to 9,000 square feet, two 24-inch stairway fire escapes.

(e) BUILDINGS OF MILL OR SLOW-BURNING CONSTRUCTION SHALL BE EQUIPPED WITH FIRE ESCAPES AS FOLLOWS:

With floor area of 8,000 square feet or less, one 24-inch stairway fire escape.

With floor area of 8,000 square feet to 12,000 square feet, two 24-inch stairway fire escapes.

(f) BUILDINGS OF FIREPROOF CONSTRUCTION SHALL BE EQUIPPED WITH FIRE ESCAPES AS FOLLOWS:

With floor area of 10,000 square feet or less, one 24-inch stairway fire escape.

With floor area of 10,000 to 20,000 square feet, two 24-inch stairway fire escapes.

With floor area of more than 20,000 square feet, three 24-inch stairway fire escapes.

(g) FIREPROOF WAREHOUSE BUILDINGS SHALL BE EQUIPPED WITH FIRE ESCAPES AS FOLLOWS:

With floor area of 12,000 square feet or less, one 24-inch stairway fire escape.

With floor area exceeding 12,000 square feet, two 24-inch stairway fire escapes.

(h) A fireproof bridge built as described in Section 880 and connecting each floor of two neighboring buildings occupied by the same person, firm or corporation, shall be considered the equivalent of a fire escape, or of an interior stairway, but not the equivalent of both.

(i) In buildings of Class II there shall be a stairway or a fire escape as near as practicable to the end of each corridor, and where a corridor is endless the stairs and the fire escapes shall be located around and connected to said hall or corridor at distances approximately equal to each other.

(j) The openings leading to fire escapes on hospitals shall be flush with the floor leading to the fire escape which may be inclined not more than $2\frac{1}{2}$ inches vertical to 12 inches of horizontal measurement, and shall be constructed and maintained with no obstructions thereon.

(k) In buildings hereafter erected wherever stairway fire escapes are considered the equivalent of an interior stairway or as taking the place of any of the "Width of Stairs" required by this chapter, there shall be a door or casement window leading to such fire escape from each floor. Windows and doors to such fire escapes shall not be less than 24 inches in width and not less than 72 inches in height. The sill of such windows or doors shall not be more than 24 inches above the floor, unless a stair is built leading to the same.

(l) Where a building is divided into separate areas, each such area shall be considered as a separate building and shall be equipped with stairs and fire escapes as is required for buildings by this chapter, unless otherwise herein provided.

(m) Exterior stairway fire escapes built as required by this chapter and having treads not less than 10 inches wide from nosing to riser and risers not more than 8 inches in height and having stairways extending from the inside grade to the top floor of the building or having a counter-balance section from the first story to the ground and a steel ladder from the top landing to the roof, shall be considered the equivalent of one interior stairway and one stairway fire escape, if the width of such stairway fire escapes with that of one or more stairways in the building equals the "Width of Stairs" required for the area of the respective buildings by this chapter.

(n) Where a Fire Shield Stairway is constructed according to the following provisions and requirements, such Fire Shield Stairway shall be considered the equivalent of a stairway or stairways or a fire escape and stairway or stairways combined, as per the provisions of Paragraph "f" of this section.

The Fire Shield Stairway shall be divided or separated from the building by, and completely enclosed with, brick walls or walls of fireproof material not less than twelve inches thick, or by a wall of reinforced concrete and tile in combination not less than ten inches thick subject to the approval of the Commissioner of Buildings. The walls are to be built from the lowest floor level to and at least thirty-six inches above the roof, except as otherwise herein provided. The roof shall be built of fireproof construction, and all door openings must be provided with fireproof thresholds, metal frames and approved incombustible doors. The risers of all stairs shall be not more than eight inches and the tread not less than nine inches, and winders in stairs shall not be permitted. The nearest riser of the stair in a downward direction must be remote from the entrance to the Fire Shield Stairway a distance not less than the width of

the stairs. The entrance shall be by a fireproof vestibule or by an outside balcony. Said balcony shall be constructed on private property and shall not encroach on or overhang a public street or alley. Said vestibule or balcony shall be not less than five feet wide and the floors, ceiling and sides thereof shall be of fireproof material. One side of said Fire Shield Stairway shall face a street or alley or an open space leading directly to and connecting with a public street or alley. The side of said vestibule facing the street, alley or other open space, shall be open for the full width thereof from a point four feet above the floor to the underside of ceiling in each story.

The open space above said wall may be enclosed by a fire shield in the following manner only:

A metal frame constructed of steel of commercial shape, or a sheet metal frame filled with concrete, with a horizontal cross piece midway between the top and bottom of said frame, may be fitted in the opening flush with the inside face of the wall. This frame may be hung with two sashes, sash to be of metal and glazed with fire-resisting glass, hinged at the bottom and arranged to open out from the top, and restrained by angle iron or chain attached to the inner part of jambs of the opening, so as to allow sash to rest on same in an open position, in such a manner that the top edge of sash will be flush with the outer face of the wall. The mason work at the head of the wall opening shall be beveled off at an angle of forty-five degrees. The opening and closing of these sashes are to be controlled by a mechanical device to be approved by the Commissioner of Buildings. Where sash exceed five feet in width, intermediate piers of masonry sixteen inches wide by the breadth of wall in thickness may be built, and the resulting openings shall be each treated as hereinbefore stated. All metal sash and fire-resisting glass installed shall be subject to specifications and requirements elsewhere contained in this chapter.

The entrance from the building into the Fire Shield Stairway shall be through the vestibule or by means of the balcony only. All openings from the building to the balcony or vestibule and from the balcony or vestibule to the Fire Shield Stairway shall be not less than six feet nor more than seven feet in height and not less than four feet in width, and shall be provided with approved incombustible doors hung in metal frames and may be glazed with fire-resisting glass. In all cases, the floor of the vestibule or balcony, or floor landing of stairs, and the floor of the building containing Fire Shield Stairway shall be at the same level.

Where balconies are used as a means of access from the building to the Fire Shield Stairway, the floors of same shall be solid and built of fireproof material, and shall be of sufficient strength to sustain a load of one hundred pounds per square foot within the safe limits of stress for materials, as elsewhere specified in this chapter. Said balcony on each story shall be provided on the open side with an incombustible enclosure four feet high. There shall be a sufficient number of windows in the wall between the vestibule and stairway, or the doors to stairway shall be fitted with fire-resisting glass of sufficient area to properly light the said Fire Shield Stairway. All window openings shall be equipped with metal frames and sash and fire-resisting glass. The entire stairway, vestibule and balconies on all floors shall be provided with adequate means of illumination by gas or electricity on a separate circuit, and shall be lighted during all the time any part of the building in which they are located is being used after sunset or whenever lighting shall be required. The Fire Shield Stairway shall terminate at a landing on a level with, or not to exceed six inches above the street, alley or other open space on which

faces; and access from said landing to said street, alley or other open space, shall be direct by means of an incombustible door or doors equipped with a metal frame and fire-resisting glass, not less than six feet nor more than seven feet in height, and not less than four feet in width. Connection to said Fire Shield Stairway from first floor will not be required if first floor has sufficient exits properly located. All doors to Fire Shield Stairway shall be of the style known as "double acting doors." In buildings other than skeleton construction a slip joint must be provided in the masonry walls between the tower and any wall connecting or abutting thereto, subject to the approval of the Commissioner of Buildings.

Plans in detail, showing the construction and equipment and all other features of a Fire Shield Stairway shall be submitted in addition to the general plan showing the proposed location of same. Such details shall be drawn to an enlarged scale, and shall consist of a typical floor plan, a typical elevation and cross section of one or more stories and other stories which deviate from typical plan, and shall be approved by the Commissioner of Buildings before a permit for construction of same is issued.

(c) In buildings not more than two stories in height one stairway may be omitted if the building is equipped with a three-foot stairway fire escape built as required for fire escapes in this section with counter-balance drop and placed as far as practicable from the remaining stairway.

(p) Where fireproof buildings have a frontage upon public alleys or have courts of an area of not less than 320 square feet, and where such courts lead directly to a public thoroughfare, fire escapes may be erected on such courts or such alleys and shall not be required to be erected upon the street fronts of such buildings. Such fire escapes shall be located as far as possible from stairways in the buildings, and where it is possible to erect the fire escapes on an alley or in a court they may be thus erected subject to the approval of the Commissioner of Buildings.

(q) In fireproof buildings of Class IIa, fire escapes may be located in light courts of fifty feet in the least dimension, having no opening onto a street or alley, but such fire escape must be connected with a stairway of the building at a level no higher than twenty-five feet above finished grade at the building, said stairway to terminate at the first floor level in a public corridor, giving direct egress from the building.

(r) Such fire escapes shall not be considered as part of the width of stairs as defined in Section 878 of this chapter for such buildings unless that portion of the stairway used in connection with the fire escape is increased by the width of the fire escape, from their junction to the ground.

Hospitals two or more stories in height shall be provided with one or more stairway fire escapes not less than 40 inches between handrails. Sliding fire escapes shall have a radius or width of not less than 42 inches. Sliding fire escapes shall not be built on public thoroughfares and shall deposit the person from same not more than twenty-four inches from the surrounding ground, and sliding fire escapes on Class VIII buildings shall be constructed, located and maintained in accordance with the provisions relating to Class VIII.

Wherever stairway fire escapes are considered by this chapter to be the equivalent of an interior stairway or as taking the place of any of the width of stairs, there shall be a door leading to said fire escape from each floor. Such door shall not be less than 24 inches in width and not less than 72 inches in height. The sill of such door shall not be more than 24 inches above the

floor and the door shall be as wide as the stairway required on the fire escape. Where the sill is more than 24 inches from the floor, a small stairway shall be built from the floor to the window sill with treads not less than 10 inches wide and risers not more than 9 inches in height.

(s) A stairway fire escape placed on an exterior wall adjacent to a dividing or party wall shall be considered as a stairway fire escape for each building area to which it is adjacent. In such cases there shall be at least one door or window from each building area leading to the fire escape platform, and the width of each such fire escape shall not be less than 36 inches.

(t) All fire escapes shall be located and constructed to conform to the building for which they are respectively intended.

(u) If any building used wholly or in part for the purposes of Class VII be equipped with automatic sprinklers, and be connected with another building similarly used, and distant not less than twenty-five feet and used by the same occupant, by a fireproof bridge or passageway similarly equipped, then each such tier of bridges or passageways shall be held to be equivalent to and take the place of one outside stairway fire escape on each of the buildings so connected.

(See Special Ruling VI, Page 323.)

§82. Stairway Fire Escapes—Fees—Erection of—Location—Component Parts. (a) The Commissioner of Buildings and his assistants shall determine upon the location of all stairway fire escapes before erection of same is commenced.

(b) Before the work is commenced a permit shall be obtained from the Commissioner of Buildings for which a fee of \$2.00 shall be exacted.

(c) No permit for a stairway fire escape more than twenty-four inches in width shall be granted unless a detailed plan for the fire escape, approved by a licensed architect or a structural engineer, is submitted to the Commissioner of Buildings, and a copy of such plans shall be left on file with said Commissioner.

(d) All anchors for stairway fire escapes shall, wherever possible, pass through the wall of building and be secured on inside of same. Where it is possible to anchor through walls, anchors shall be put in wall not less than fifteen inches at an angle of thirty-five degrees. On buildings of steel construction, where walls are less than twenty inches in thickness there shall be steel channels at least four inches wide set on inside of building from column to column and bolted or riveted to columns, and anchors shall be bolted on inside of channels.

(e) Anchors for a platform four feet two inches or less in width shall be made of one inch square iron; over four feet two inches and not over six feet, shall be one and one-fourth inch square iron with brace; over six feet shall be one and one-half inch square iron with brace. All anchors shall be turned up not less than eight inches at the outside of the platform on which to bolt the post.

(f) Braces shall be the same thickness as the anchors. The spread of the braces shall be the width of the platform. Where the platforms are over five feet in width, anchors shall have double braces, one to the outside and one to the center of the platform.

(g) Platforms shall be not less than fifty inches wide at ends; passageways shall be not less than twenty-four inches between buildings and railings. Platforms shall be not less than five feet in length. The frames and crossbars shall be made as provided in this chapter. Platforms shall have

clips at each end bolted to anchors. No door or window or shutter shall open so as to obstruct in any way the free passage on or along a platform or a stairway fire escape.

(h) All stairway fire escapes for apartment buildings, hotels, boarding houses, factories and office buildings, where there are less than 100 people on any one floor, shall be not less than two feet wide between hand rails. Stringers for a 24-inch stairway fire escape shall not be less than 2 inches by $\frac{3}{4}$ inch set $1\frac{1}{2}$ inches apart. Where stairway fire escapes and their balconies and supports are designed and constructed in accordance with the provisions of this chapter relating to materials permitted for such stairway fire escapes, balconies and supports, so as to sustain a load of 100 pounds per square foot, they may be built of steel channels, angles, or I-beams, but when so constructed, they shall comply with the provisions of this chapter in all other respects. All stairway fire escapes for halls, churches, theaters, hospitals, schools, department stores and buildings where large numbers of people congregate shall not be less than three feet wide in the clear, and all passageways shall not be less than three feet wide in the clear. Stringers for a 36-inch stairway fire escape shall be made of two bars, 3 inches by $\frac{3}{4}$ inch, about one inch apart, or $4\frac{1}{2}$ inches by $\frac{3}{4}$ inch flat iron, or of steel channels, angles or I-beams; where over 12 feet in length, they shall have anchor and brace in the center. The tread shall be made of one-half inch square steel or iron, corner upwards, not to exceed $1\frac{1}{2}$ inches center, riveted at ends to 2 by $\frac{7}{8}$ inch flat iron or steel. There shall be not less than four bars to a tread where treads are less than twenty-seven inches in length; where treads are over twenty-seven inches in length there shall be not less than six bars to a tread; there shall be a truss supporting treads made of bar iron 2 inches by $\frac{3}{4}$ of an inch in thickness riveted to bars of treads in center, supported by not less than two inches by seven-sixteenths of an inch rods bolted at each end of treads. All stairs shall have an incline of about forty-five degrees. The rise shall be not more than nine inches and the tread not less than nine inches.

(i) All stairs shall have three bar railings made of one-inch bar iron for top rail, and three-fourths inch bar iron for lower rail, and when such stairs are more than three inches from the wall of the building, there shall be one or more hand rails on the wall side of such stairs.

(j) All posts used for stair fire escapes shall be made of one and one-half inch angle or channel iron not less than three feet six inches high, measured at right angles with the treads of such fire escapes, and shall have braces on the outside turned upwards and fastened to the frame of the balcony or stairs, which shall be not less than half way up the posts; all stair fire escapes shall extend to the ground either by counterbalance drop or stairs. All ladder fire escapes shall have either extension ladder or counterbalance drop from the first story of said building to the ground or sidewalk. All fire escapes if not continued to the roof shall be equipped with a ladder built in conformity with the specifications for ladder fire escapes contained herein from top story or attic platform to the roof. Their location, material and construction shall be subject to the approval of the Commissioner of Buildings. When cables are used for counterbalance stairs they shall not be less than three-quarters of an inch in size and shall be well oiled or greased when hung up and shall be oiled or greased at least twice a year. All pulleys and cables holding counterbalance drop shall be covered at bracket so as to be protected from snow or ice.

(k) Wherever a stairway fire escape passes a window or door on buildings hereafter erected, the windows or doors shall be of wired glass and shall have metal frames and sash, and whenever such a fire escape passes above a window, door or other opening not fitted with wired glass and metal frames the said fire escape shall be protected on the under side by sheet metal of not less than No. 20 United States gauge opposite such opening and for a distance of three feet on each side thereof. The use of intermediate platforms shall be permitted on all buildings now built or hereafter constructed whenever it is possible by their use to avoid the necessity of stairway fire escapes passing windows. All fire escapes shall be painted with two coats of mineral paint when erected, one at the shop and one upon completion at the building, and they shall be painted at least once every year thereafter.

(l) Wherever it is impossible to erect stairway fire escapes according to the provisions of this chapter, plans shall be submitted to the Commissioner of Buildings showing the location, material and construction of such stairway fire escapes as are proposed to be built before a permit is issued for the same, and if found to be impracticable to locate and construct fire escapes in accordance with the provisions of this chapter and that fire escapes built according to the plan presented would afford safe and practical means of exit from the building on which they are to be placed, then the Commissioner of Buildings may in his discretion approve the same. All such fire escapes shall be inspected by the Commissioner of Buildings on their completion and if found to be safe, satisfactory and in compliance with said approved plans, a certificate shall be issued to such effect upon the payment of \$2.00 to the City Collector. All fire escapes other than such as it is impossible or impracticable to build in accordance with the provisions of this chapter shall be inspected by the Commissioner of Buildings on their completion, and if found to be in compliance with the provisions of this chapter a certificate shall be issued by the Commissioner of Buildings upon the payment of a fee of \$2.00 to the City Collector.

(m) It shall be unlawful for any person, firm or corporation to use any building requiring fire escapes under the terms of this article until the provisions of this article shall have been complied with.

883. Ladder Fire Escapes—When Permitted. Where a building of Class III or VI, not more than four stories in height has two flights of stairs leading from the ground to the top floor of the building and where also each occupant shall have access to at least two separate and distinct stairways located as required by the provisions of this chapter from the top floor to the ground, a ladder fire escape may be used in lieu of the stairway fire escape required herein, where a counter balance drop is placed from the ladder fire escape to the ground.

884. Specifications for Ladder Fire Escapes. (a) All single and double ladder fire escapes hereafter erected shall be in strict accordance with the following provisions:

(b) There shall be not less than three one-inch square wrought iron anchors to every five-foot balcony and not less than six for a twelve-foot balcony. Such anchors shall pass through the wall of the building and be bolted on the inside with a three-fourths by two-inch nut and three and one-half inch iron washer back of the nut, where the wall is not over twenty inches thick; but where the wall is over twenty inches thick anchors shall be inserted at

least eight inches into the wall at an angle of thirty-five degrees.

(c) Where a ladder fire escape is permitted by this chapter, the side guards shall be two by three-eighths inch flat iron. All ladder fire escapes shall be seventeen inches or more in width in the clear. No pipe nor rusted or defective material shall be used in the construction of ladder fire escapes. Rungs of ladders shall be of not less than one-half inch square iron with corners upward so as to give a safe footing. Rungs shall be riveted and shall be constructed with fourteen-inch centers.

(d) The brace for the anchors shall be at least twenty inches spread and shall extend into the wall four inches; no other form of anchor shall be allowed except by special permit from the Commissioner of Buildings.

885. Balconies — Construction of. All balconies hereafter erected shall be either steel or wrought iron and capable of sustaining a weight of one hundred pounds to the square foot. The balcony frame shall be made of not less than two-inch by two-inch by one-fourth inch angle iron which shall be securely riveted together with crossbars every two feet. Such bars shall be punched one-half inch square close to the top of the bar on two inch centers and one-half inch square iron bars shall be forced through the same. The crossbars shall be securely riveted to the angle iron frame. The crossbars for a balcony twenty-eight inches wide shall be two inch by three-eighths inch. Balcony frames over twenty-eight inches wide shall be made of not less than two by three-eighths inch iron and made to conform with the increased dimensions of iron in crossbars for thirty-six inch balcony or more they shall be two and one-half inch by three-eighths inch. All balconies over this width shall have a two-inch "T" iron through the center of the balcony for the bars to rest upon; provided that such balconies and platforms of buildings of Class IIc may be built as described in Section 482 of this chapter. Such balconies shall have a substantial cast or wrought iron post every three feet bolted to the balcony. No balcony shall have less than three guard rails which shall be of wrought iron or new iron pipe not less than three-fourths inch in diameter and the ends shall be securely anchored to the wall of the building and shall be not less than ten inches on an angle of thirty-five degrees. Where stairway fire escapes and their balconies are designed and constructed in accordance with the provisions of this chapter to sustain a load of one hundred pounds per square foot, they may be built of steel channel angles or I-beams, but in such cases they shall comply with the requirements of this chapter in all other respects.

886. Stairs and Fire Escapes—Change in Construction. No change in the position of any existing fire escape or stairway shall be made, nor shall any change in the position of any stairway or fire escape as shown on approved plans be permitted, unless the written consent of the Commissioner of Buildings shall first have been obtained.

ARTICLE XXI.

Elevators and Their Enclosing Walls.

887. Elevator—Passenger and Freight—Permit for Construction. (a) Before proceeding with the construction or alteration of any passenger or freight elevator, except such as are hereinafter specially exempted from the provisions of this chapter, a permit for such construction or alteration shall be obtained from the Commissioner of Buildings either by the owner or agent of the building in which such ele-

vator is to be constructed or in which such alterations are to be made, or by the contractor who is about to construct or alter such elevator.

(b) It shall be unlawful for any such owner, agent, or contractor to permit or allow the construction of any such elevator or the making of such alterations, or to proceed with or in or about any of the work of construction or alteration of any such elevator until such permit shall first have been obtained. Such permit shall be issued by the Commissioner of Buildings after application shall have been made to him therefor by any such owner, agent or contractor, specifying the number and kind of elevators which it is desired to construct, or the nature of the alterations to be made and the location of the building or structure in which the same is or are to be placed or made. Such application shall be accompanied with such plans and specifications as shall be necessary to advise and inform said Commissioner of the plan of construction, type of elevator, kind of alterations and the location thereof. If such plans and specifications shall show that such elevator or elevators is or are to be constructed or erected or altered in conformity with the provisions of this chapter, the Commissioner shall approve the same and shall issue a permit to such applicant upon the payment of such applicant of a fee of two dollars for each elevator to be constructed, erected or altered, and such fee shall be known as a permit fee and shall not be held to cover the cost of any inspection which shall at any time thereafter be made of such elevator or elevators when constructed, or of any alterations made.

888. Fee.) All contractors or persons, firms, or corporations, engaged in the manufacture and work of installing iron doors on passenger or freight elevators, or of installing wire work enclosures around elevators, shall secure a permit from the Commissioner of Buildings for the work on each such elevator, the fee for which shall be two dollars for each elevator in buildings of four stories or less in height, and in buildings of more than four stories in height fifty cents additional shall be charged on each elevator for every additional floor in excess of such four stories.

889. Unlawful to Proceed Without Permit.) It shall be unlawful for any person, firm or corporation either as owner, lessee, contractor or agent of any building or structure in which any elevator or elevators are to be constructed or altered to proceed with said work without securing a permit as herein required for such construction or alteration, and no such permit shall be issued until such person, firm or corporation, lessee, contractor or agent shall have complied with all the requirements of this chapter.

890. Inclosure of Elevator Shafts in Non-Fireproof Buildings.) In all non-fireproof buildings erected after March 13, 1911, all passenger elevators and all freight elevators, except such as are expressly excepted by this chapter, shall be inclosed in a wall of brick, tile or such incombustible material as may, from time to time, be approved by the Commissioner of Buildings as proper and suitable for the purpose; such inclosure shall extend from the foundation to the roof of such building, and shall be supported independently of the floor construction; provided, however, that the requirements of this section shall not apply to any non-fireproof building which is equipped throughout on every floor and in every room thereof and in all stairways, platforms, elevator shafts, elevator holstways and well holes with an automatic sprinkler system approved by the Chief Fire Prevention Engineer.

891. Inclosure of Pits and Shafts in Basements.) In all buildings heretofore or

hereafter erected, not included in Section 890, whenever any elevator shaft extends down into a basement or sub-basement, that portion thereof extending below the level of the floor of the first story shall be inclosed in walls of brick, tile or other fireproof material, and the door openings in such inclosure shall be protected by incombustible doors. Where such elevator shafts do not extend down into the basement they shall be provided with fireproof pits at the lowermost floor level above which they serve, and such pits shall have no openings except for cables or other elevator equipment.

892. Inclosure of Dumb Waiter Shafts—Materials.) In all non-fireproof buildings hereafter erected, the dumb waiter shafts shall be inclosed with brick, tile, reinforced concrete, or cement plaster not less than two inches thick or metal studs and lath.

893. Doors—On Elevators.) In all elevator shafts which are herein required to be enclosed with fireproof walls, the door openings shall be equipped with doors of incombustible material, which shall be made to open from the outside by means of a key or other device satisfactory to the Commissioner of Buildings.

894. Hatch Doors—Freight Elevators.) Elevators, used exclusively as freight elevators constructed and in operation at the time of the passage of this ordinance need not have enclosing walls, but in all such cases there shall be at every floor through which such freight elevators pass automatic hatch closers or automatic doors, made in such manner that they will fully close each well hole when the temperature in such well hole exceeds 140 degrees Fahrenheit; and it shall be the duty of the owner, agent or person in possession, charge or control of a building in which such elevator is maintained to keep such hatch closers or doors at all times in good working order. Such automatic hatch closers shall be examined by the Commissioner of Buildings and the Chief Fire Inspection Engineer, and if said officials shall find that such doors will automatically close when the temperature at or near such doors exceeds 140 degrees Fahrenheit, and that the conditions of construction and operation of such doors or hatch closers are such that there is no reasonable probability of their getting out of order and failing to operate when required, and that in their construction or operation there is nothing that is likely to cause accidents or to interfere with the elevator service in such hatch holes which they were intended to close, and that the building in which such freight elevator is in use is equipped with stairways, fire escapes and passenger elevators sufficient to offer ample means of escape from such building in case of fire, for all persons employed or for all persons in such building, then, and in such case only, shall the use of such hatch doors or closers be permitted. All freight elevators in non-fireproof buildings shall comply with the preceding requirements of this section, or shall have inclosing walls of incombustible or fireproof construction. Such elevators are to be inspected semi-annually and oftener when, in the opinion of the Commissioner of Buildings, such inspection is necessary and such fees shall be paid for said inspection as otherwise provided in said chapter.

895. Safety Device.) (a) Every passenger and freight elevator now in operation or hereafter installed, except such as are hereinafter exempted from the provisions of this chapter, shall be provided with a speed governor and such other efficient device to secure the safe operation of such passenger or freight elevator, and to prevent the cab or car of such elevator from falling, and to secure the safety of the cab or car and its load in case it does fall, as

may be required by the Commissioner of Buildings. Such speed governor and other devices shall be subjected to such a practical test as may be determined by the Commissioner of Buildings for the purpose of ascertaining the efficiency of such safety device.

(b) It shall be the duty of the Commissioner of Buildings to make such test of each and every device upon all elevators, and no elevator shall be permitted to be run until such test has been made.

(c) Whenever any accident shall occur causing injury to life or limb to any person, in or about an elevator, or while getting on or off an elevator, or which shall in any way impair the safety of the elevator, such accident shall be reported at once by the owner, superintendent, lessee or manager of the building, or the operator of the elevator, to the Commissioner of Buildings. No broken or damaged parts of such elevator shall be moved or displaced, nor shall repairs be made thereon, nor shall said elevator be operated until an investigation into such accident has been made by the Commissioner of Buildings or his duly authorized agent. A full report in writing of the result of such investigation shall be filed in the Department of Buildings, and the Commissioner of Buildings shall keep a complete record of all such accidents and reports thereon.

(d) It shall be unlawful for any operator of any elevator in the City wherein passengers are conveyed to start such elevator until all doors of such elevator and leading into such elevator shall be closed. It shall be unlawful for any such operator to open any of the doors of such elevator until said elevator has come to a full stop.

(e) Any person, firm or corporation violating any of the provisions of this section, or failing or neglecting to comply therewith, shall be fined not less than twenty-five dollars nor more than two hundred dollars for each offense.

896. Safeguards for Elevators.) (a) Where the counterweights travel in the same hatchway with an elevator car, the portion of the car contiguous to the weights shall be protected from the top to the bottom of the car by a suitable guard.

(b) All freight elevators shall be provided with a guard at least six feet high. All elevator cabs or cars, whether used for freight or passengers, shall be provided with some device whereby the car or cab may be held in the event of accident to the shipper rope or hoisting machinery or controlling apparatus.

(c) No passenger elevator hereafter erected shall be installed with a freight compartment either below or above the car.

(d) All hoistways, hatchways, elevator wells and wheel holes in any building, whether occupied or vacant, shall be securely fenced, inclosed or otherwise safely protected, and it shall be the duty of the owner, occupant or agent of any such building to keep all such means of protection closed at all times, except when it is necessary to have the same open, in order that the said hatchways, elevators or hoisting apparatus may be used.

(e) It shall be unlawful to erect or maintain an elevator where such elevator or its counterweight descends into any passageway or thoroughfare.

(f) There shall be directly under the sheaves at the top of every elevator hatchway, a grating of steel or heavy wire mesh properly supported by steel or iron and capable of sustaining a load of not less than 500 pounds.

(g) All counterweights hereafter installed shall have their component parts so fastened together as to prevent any piece or

pieces from becoming detached from the guides should the counterweights be accidentally drawn to the top of the hatchway.

(h) Where drum counterweight cables run through or pass by the car counterweights to weights underneath, they shall be provided with a suitable covering to prevent their chafing and wearing on the counterweights.

(i) Where elevators other than hand-hoists and sidewalk elevators are not inclosed with fireproof or incombustible material, as is elsewhere herein specified in this Article, the well-hole of such elevator shall be enclosed with a wire guard not less than six feet high. The counterweights and the immediate space through which they travel must be protected from the floor to the ceiling with a wire guard or with other incombustible material. There must be on all elevators hereafter constructed a clear space of not less than two feet between the bottom of the hatchway and the level of the lower floor landing when the car is at its lowest position, and there must be a clearance of at least four feet from the top of the crossbeam of the car to the lower side of the grating under the overhead sheaves. Whenever there is conflict in regard to the manner of enclosing any elevator shaft or portion thereof between this section and Sections 890, 891 and 892, the provisions of the latter sections shall prevail.

(j) All passenger and freight elevators hereafter installed, except sidewalk or hand elevators, shall have an artificial traveling gas or electric light attached to the car and maintained in good working condition.

(k) All power driven elevators hereafter constructed or installed shall have at least two hoisting cables for the cage and two cables for each counterweight. The lifting and counterweight cables shall have at least one full turn of the cable on the drum when the car has run its limit.

(l) It shall be unlawful to change a hand-hoist to a power-driven elevator without first making application to the Commissioner of Buildings for a permit for such change, and it shall be unlawful to connect an electric motor or any other appliance to the hand elevator machinery without the approval of the Commissioner of Buildings.

(m) All elevators, except hand elevators operated by a pulley rope and sidewalk ram or chain hoist elevators, and elevators used in tunnels for freight service only, shall be equipped with a safety speed governor.

(n) Where ropes or cables are used to operate safety devices, a weight shall be properly attached to the same in such a manner as to insure the necessary tension on such rope or cables for proper performance of the safety devices.

(o) All elevators propelled by electricity shall be provided with an additional device not operated by link or sprocket chain which will automatically stop the elevator machinery when the car has reached its limit of travel. It shall be unlawful to construct or maintain any elevator equipped with a sprocket chain or link belt device or devices connecting the operating device and controller.

(p) An emergency switch which will disconnect the current shall be provided in all passenger elevators hereafter installed which are operated by an electric controller car switch, and such cars shall be so constructed that they will automatically stop when the current is disconnected.

(q) The underside of the floors or other parts of a building which project into passenger elevator shafts shall be equipped with a smooth steel guard curved and sloped from the enclosure of said elevator to the edge of such protection for the width of

the door to such elevator car and the slope of the guard plate shall not be less than sixty degrees with the horizon.

(r) The provisions of this section requiring the equipment of elevators with safety devices shall not apply to any hand hoists, elevator or hoist used solely for hoisting materials or tools in any building in course of construction, but the Commissioner of Buildings shall make such reasonable requirements as he may deem necessary for public safety in the operation of such hand hoists, elevators or hoists used solely for hoisting materials or tools in such buildings while under construction.

897. Inspection—Test—Certificate to Be Posted.) (a) Every elevator now in operation or which may be hereafter installed, together with the hoistway and all equipment thereof, shall be inspected under and by the authority of the Commissioner of Buildings at least once every six months, and in no case shall any new elevator be placed in operation until an inspection of the same has been made.

(b) It shall be the duty of every owner or agent, lessee or occupant of any building wherein any elevator is installed and the person in charge or control of any elevator to permit the making of a test and inspection of such elevator or elevators and all devices used in connection therewith upon demand being made by the Commissioner of Buildings or by a duly authorized Elevator Inspector within five days after such demand has been made.

(c) Whenever any such elevator has been inspected and the tests herein required shall have been made of all safety devices with which such elevator is required to be equipped and the result of such inspection and tests shows such elevator to be in good condition, satisfactory to the Commissioner of Buildings, and that such safety devices have been provided in accordance with the requirements of this chapter and are in good working condition and in good repair, it shall be the duty of the Commissioner of Buildings to issue or cause to be issued a certificate setting forth the result of such inspection and tests and containing the date of inspection, the weight which the elevator will safely carry and a statement to the effect that the shaft doors, hoistway and all equipment, including safety devices, are constructed in accordance with the provisions of this chapter, upon the payment of the inspection fee required by this chapter.

(d) It shall be the joint duty of the owner, agent, lessee or occupant of the building in which such elevator is located and of each person in charge or control of such elevator to frame the certificate and place same in a conspicuous place in each elevator.

(e) The words "safe condition" in this section shall mean that it is safe for any load up to the amount of weight named in such certificate.

(f) Where the result of such inspection or tests shall show such elevator to be in an unsafe condition or in bad repair, or shall show that the safety devices, or any of them, which are required by this chapter, have not been installed, or if installed, are not in good working order or not in good repair, such certificate shall not be issued until such elevator, its hoistway and its equipment or such device or devices shall have been put in good working order, satisfactory to the Commissioner of Buildings. The inspection fees herein required shall be paid either at the time application is made for inspection or upon the completion of such inspection and tests.

898. Power of Commissioner to Stop Operation of Elevators.) (a) Whenever any building or elevator inspector finds any pas-

senger or freight elevator or any of its running parts or automatic devices or other equipment out of order, or in an unsafe condition, he shall immediately report the same to the Commissioner of Buildings, together with a statement of all the facts relating to the condition of such elevator or elevators.

(b) It shall be the duty of the Commissioner of Buildings upon receiving from any inspector a report of the unsafe condition of any elevator, to order the operation of such elevator to be stopped, and to cause such elevator not to be used until the same shall have been placed in a safe condition, and it shall be unlawful for any owner, agent, lessee, or occupant of any building, wherein any such passenger or freight elevator is located within the city, to permit or allow any such elevator to be used after the receipt of a notice in writing from the Commissioner of Buildings that any such elevator is out of order or is in an unsafe condition and until said elevator has been put in a safe and proper condition as required by the provisions of this chapter.

ARTICLE XXII.

Building Contractors.

899. Building Contractors—Registry with Department of Building.) That every person, firm, or corporation engaged in the business of constructing or repairing the whole or any part of buildings or the appurtenances thereto in the City of Chicago, shall before undertaking the erection, enlargement, alteration, repair or removal of any building, for which permits are required by the ordinances of the City, register the name and address of such person, firm, or corporation in a book kept by the Commissioner of Buildings and used for this purpose.

No permit shall be granted for the erection, enlargement, alteration, repair or removal of any building unless the name and address of the person, firm, or corporation that is about to undertake the work of construction on such buildings is contained in the registration book kept for that purpose.

900. Where Masonry Work Only is Required.) When application is made for a permit and the work of construction involves masonry construction only the above provisions shall not apply to any person, firm or corporation licensed as a mason contractor or employing mason as provided in and by the ordinances of the City. Where the work of construction, for which a permit is sought involves construction other than masonry construction, any mason contractor or employing mason, licensed as aforesaid, engaged in or undertaking the work of such construction other than masonry construction must register his, their or its name or names and comply with the other requirements of this article before a permit for such work is issued.

901. Liability for Violations.) If any person, firm or corporation that is so registered shall fail, in the execution of any work for which a permit was issued, to comply with the ordinances of the City relative to the erection, enlargement, alteration, repair or removal of any building, either the Commissioner of Buildings or the Commissioner of Health may bring suit and prosecute such person, firm or corporation for such failure or violation, and in case of conviction, his, their or its name or names shall be stricken from the said registration book and shall not be re-entered or reinstated during such time as any violation exists or any judgment remains unsatisfied with regard to said conviction.

902. Reinstatements.) Any person, firm or corporation that shall have been convicted under the preceding section and had his,



V. W. C. A. Bldg., Oak & Dearborn Sts., Chicago, Ill.

Berlin & Swern, Architects

R. F. WILSON & COMPANY

Building Construction



1841-51 ELSTON AVENUE

CHICAGO

Phone BRUNSWICK 1066-67-68

their, or its name or names stricken from such registration book may have such name or names re-entered on filing with the Commissioner of Buildings a certificate signed by the City Prosecutor, the Commissioner of Buildings and the Commissioner of Health to the effect that all violations of ordinance with reference to which conviction was secured, have been corrected and are non-existent and that all claims and judgments arising from such convictions have been paid.

ARTICLE XXIII.

Billboards, Signboards, Signs, and Fences.

903. **Billboards and Signboards on Buildings—Construction—Height.)** No billboard or signboard shall be erected or placed upon or above the roof of any building or structure within the limits of the City of Chicago; and it shall be unlawful for any person, firm or corporation to attach any billboard or signboard to the front, sides, or rear walls of any building, unless the same shall be placed flat against the surface of the building and safely and securely anchored or fastened thereto in a manner satisfactory to the Commissioner of Buildings.

904. **Size and Construction of Billboards and Signboards Erected Within Fire Limits Otherwise Than on Buildings.)** The face of billboards or signboards erected within the fire limits as now defined or as they may hereafter be defined by ordinances of the City of Chicago other than signboards and billboards referred to in Section 906 hereof, shall not exceed twelve feet in height, and the same shall be constructed of galvanized iron or some other equally incombustible material, except that the stringers, uprights and braces thereof may be of wood. All such billboards or signboards shall be securely anchored or fastened so as to be safe and substantial.

905. **Height and Distance From the Ground of Billboards and Signboards Erected Within the Fire Limits.)** It shall be unlawful for any person, firm or corporation to construct or erect any billboard or signboard, except those specified in Section 906 hereof, within the fire limits of the City of Chicago at a greater height than fifteen feet six inches above the level of the adjoining street. Where the grade of the adjoining street or streets has not been established, no billboard or signboard shall be constructed or erected at a greater height than fifteen feet six inches above the level of the ground upon which such billboard or signboard is erected. The face of every billboard or signboard within the fire limits shall be of incombustible material, but the supports and framework of the same shall be of wood. The base of the billboard or signboard shall, in all cases, be at least three feet six inches above the level of the adjoining street. If, however, the level of the ground where the billboard or signboard is to be erected is above the level of the street, then the bottom of the face of the billboard or signboard must be at least three feet six inches above the level of the ground at the point where the board is to be erected. Every such billboard or signboard must be constructed and located in accordance with the provisions of this Article and shall be subject to the approval of the Commissioner of Buildings.

906. **Wooden Billboards or Signboards—Construction—Size—Exceptions.)** Billboards or signboards not exceeding twenty-four (24) square feet in area when attached to the front, sides, or rear walls of any building, so that the flat surface of same is against the building, or when erected on the ground, if not erected nearer than ten feet to any building, structure, other signboard or public sidewalk, which are used to advertise the sale or lease of the property upon which

they shall be erected, may be built of wood or other combustible material, and such billboards or signboards shall be exempt from the provisions of this article, except that they shall be safely and securely anchored or fastened and shall be so constructed, anchored and fastened that they will withstand the wind pressure specified in Section 911 of this Article. It shall be unlawful to erect any such billboard or signboard exceeding twenty-four (24) square feet in area before a permit therefor has been procured from the Commissioner of Buildings, the application for which must include the plans and specifications of such board and its supports and fastenings.

907. **Billboards and Signboards Erected Outside the Fire Limits—Construction—Size.)** It shall be unlawful for any person, firm or corporation to construct, erect or locate any billboard or signboard, except those specified in Section 906 hereof, outside the fire limits of Chicago at a greater height than fifteen feet six inches above the level of the adjoining street. Where the grade of the adjoining street has not been established, no billboard or signboard shall be constructed or erected at a greater height than fifteen feet six inches above the level of the ground upon which such billboard or signboard is erected. The base of the billboard or signboard shall, in all cases, be at least three feet six inches above the level of the adjoining street. If, however, the level of the ground where the billboard is to be erected is above the level of the street, then the bottom of the face of the billboard or signboard must be at least three feet six inches above the level of the ground at the point where the board is to be erected. The braces, supports and face of the billboard or signboard outside the fire limits may be made of wood, unless the billboard or signboard shall be erected or located so that any part of the face of said board is nearer than ten feet to any building or structure in which case the face of the same shall be constructed with incombustible material. Every such billboard or signboard shall be safely and securely constructed, anchored, fastened and located in accordance with the provisions of this article and shall be subject to the approval of the Commissioner of Buildings.

908. **Provisions of This Article Shall Apply to Other Similar Structures.)** The provisions of this article shall apply to other similar structures of like size and construction without regard to their use whether erected on or near the surface of the ground or anchored to, or fastened to any building or structure.

909. **Permit for Billboard or Signboard.)** No billboard or signboard or other similar structure such as is described in this article shall be erected or maintained within the city unless a permit shall first have been secured by the person, firm or corporation desiring to erect or maintain such billboard or signboard from the Commissioner of Buildings to whom application for such permit shall be made; and such application shall be accompanied by such plans and specifications of the proposed billboard or signboard and location of same as are necessary to fully advise and acquaint the said Commissioner with the construction of such proposed billboard or signboard. If the plans and specifications accompanying such application shall be in accordance with the provisions of this article, said Commissioner shall thereupon issue a permit for the erection of such billboard or signboard upon the payment by the applicant of a fee as hereinafter fixed.

910. **Alteration and Repair of Billboards and Signboards.)** No material alteration of any billboard or signboard nor removal from one location to another shall be made ex-



Merchandise Mart, Chicago.

Graham, Anderson, Probst & White, Architects

John Griffiths & Son Co.

Builders

Chicago. :: Illinois

cept upon a written permit issued by the Commissioner of Buildings authorizing such alteration or removal; and such permit shall be issued upon application in writing made to such Commissioner by the owner of such billboard or signboard or by the person in charge, possession or control thereof, accompanied by a plan of the proposed alterations or repairs to be made and a written statement covering the proposed removal from one location to another and its reconstruction in the new location, which said alteration and repairs or removal shall be made in accordance with the provisions of this article and the ordinances of the City of Chicago. Where such plans, specifications and location are in compliance with the requirements of this article and are satisfactory to and approved by the Commissioner of Buildings, such Commissioner shall issue a permit upon the payment of a fee therefor as hereinafter fixed; but such alteration shall not be construed to apply to the changing of any advertising matter of any billboard or signboard, nor the refacing of the framework supporting same.

911. Wind Pressure—Strength.) All billboards and signboards now in existence, or hereafter to be constructed, erected or maintained, shall be made, constructed, erected and maintained of sufficient strength to withstand a wind pressure of twenty-five pounds per square foot of surface without stressing the material beyond the safe limit of stress given elsewhere in this chapter.

912. Height of Billboards and Signboards.) No surface billboard or signboard constructed or erected prior to the passage of this ordinance shall be maintained after six months from and after the passage of this ordinance where the height of such billboard or signboard exceeds seventeen feet, nor shall such billboard or signboard be maintained after such date, unless there is a clear space of at least three feet six inches above the level of the adjoining street. If, however, the level of the ground where the billboard or signboard is erected or maintained is above the level of the street there must be a clear space of at least three feet between the bottom or face of the billboard or signboard and the level of the ground at the point where the billboard or signboard is erected or maintained.

913. Duty of Commissioner—Owner's Name to Be Placed on Top of Billboard or Signboard—Annual Inspection.) It shall be the duty of the Commissioner of Buildings to inspect all plans and specifications submitted in connection with the erection or construction or the alteration or repair of any billboard or signboard and to approve same if the method of construction and provisions made for fastening, securing, anchoring and maintaining such billboard or signboards are such as will serve to protect the public and to render such billboards safe and substantial. It is further made the duty of the Commissioner of Buildings to exercise supervision over all billboards and signboards erected or being maintained under the provisions of this article; and to cause inspection by inspectors in his department of all such billboards and signboards to be made once each year and oftener where the condition of such boards so require; and whenever it shall appear to said Commissioner that any such billboard or signboard has been erected in violation of this article or is in an unsafe condition or has become unstable or insecure or is in such a condition as to be a menace to the safety or health of the public, he shall thereupon issue or cause to be issued a notice in writing to the owner of such billboard or signboard or person in charge, possession or control thereof, if the whereabouts of such person is known, informing such person, firm or corporation of the violation of this article and the dangerous

condition of such billboard or signboard and directing him to make such alterations or repairs thereto, or to do such acts or things, as are necessary or advisable to place such billboard or signboard in a safe, substantial and secure condition and to make the same comply with the requirements of this article within such reasonable time as may be stated in said notice. If the owner or person in charge, possession or control of any billboard or signboard when so notified shall refuse, fail, or neglect to comply with and conform to the requirements of such notice, said Commissioner shall, upon the expiration of the time therein mentioned, alter, change, tear down or cause to be torn down such part of such billboard or signboard as is constructed and maintained in violation of this article, and shall charge the expense to the owner or person in possession, charge or control of such billboard or signboard and the same shall be recovered from such owner or person by appropriate legal proceedings. If the owner of such billboard or signboard or the person in charge, possession or control thereof cannot be found, or his or their whereabouts cannot be ascertained, the Commissioner shall attach or cause to be attached to said billboard or signboard, a notice of the same import as that required to be sent to the owner or person in charge, possession or control thereof, where the owner is known; and if such billboard or signboard shall not have been made to conform to this ordinance and be placed in a secure, safe and substantial condition, in accordance with the requirements of such notice, within thirty days after such notice shall have been attached to such billboard or signboard, it shall be the duty of the Commissioner of Buildings to thereupon cause such billboard or signboard or such portion thereof as is constructed and maintained in violation of this article to be torn down; provided that nothing herein contained shall prevent the Commissioner of Buildings from adopting such precautionary measure as may be necessary or advisable in case of imminent danger in order to place such billboard or signboard in a safe condition, the expense of which shall be charged to and recovered from the owner of such billboard or signboard or person in charge, possession or control thereof in any appropriate proceedings therefor. No permit shall be issued to any applicant for permission to erect a billboard or signboard unless such applicant shall agree to place and maintain on the top of such billboard or signboard the name of the person or corporation owning same or who is in charge, possession or control thereof. It shall be the duty of the Commissioner of Buildings to require that the name of the person or corporation owning or in possession, charge or control of such billboard or signboard is placed upon such billboard or signboard forthwith upon the erection thereof and is kept thereon at all times such billboard or signboard is maintained; and in case the owner of such billboard or signboard or the person in charge, possession or control thereof shall fail or refuse to place and maintain such name on the same, such owner or person shall be subject to the penalty hereinafter provided for. Every person, firm or corporation engaged in the business of erecting billboards or signboards for the purpose of displaying advertising shall file with the Commissioner of Buildings within ninety days after the passage of this ordinance a full and complete report of the location and size of all existing billboards or signboards unless such record is already in the possession of the Commissioner of Buildings.

914. Fees for Permits and Annual Inspection—Indemnifying Bond.) (a) The fee to be charged for permits issued for the erection or construction of billboards or signboards or for the alteration thereof shall be



Chicago Stadium, 1800 W. Madison St., Chicago.

Hall, Lawrence & Ratcliffe, Architects

J.W. SNYDER CO.

GENERAL CONTRACTORS

Telephones: Central 4012-4013

**MASONRY, CARPENTRY
REINFORCED CONCRETE**

307 N. Michigan Avenue, Chicago, Illinois

five dollars for each twenty-five lineal feet of billboard or signboard erected or altered. An annual fee of one dollar for each twenty-five lineal feet of billboard or signboard, or fractional part thereof shall be charged every person, firm or corporation as owner, or in possession, charge or control of any billboard or signboard for inspection of such billboards or signboards; provided, however, that where such signboard does not exceed sixty-five square feet in area and is attached to the surface of a permanent building in accordance with the provisions of Section 903 and is designed to give publicity to the business carried on within such building, and no part of said sign is more than eighteen feet above the average inside grade at the front of the building, no fees for erection or inspection shall be charged; but not more than one sign of sixty-five square feet shall be allowed for each twenty-five lineal feet of frontage, unless the fees for erection and inspection are paid as herein provided for.

(b) Every person, firm or corporation engaged in the business of constructing and erecting billboards or signboards shall file with the City Clerk a bond, with sureties to be approved by the Commissioner of Buildings, in the penal sum of twenty-five thousand (\$25,000.00) dollars, conditioned that such person, firm or corporation shall faithfully comply with all the provisions and requirements of this article with respect to the construction, alteration, location and safety of billboards or signboards and for the payment of the inspection fees required by this article; and conditioned, further, to indemnify, save and keep harmless said City of Chicago and its officials from any and all claims, damages, liabilities, losses, actions, suits or judgments which may be presented, sustained, brought or secured against the City of Chicago or any of its officials on account of the construction, maintenance, alteration or removal of any of said billboards or signboards, or by reason of any accidents caused by or resulting therefrom.

915. Frontage Consents Required.) It shall be unlawful for any person, firm or corporation to erect or construct any billboard or signboard in any block on any public street in which one-half of the buildings on both sides of the street are used exclusively for residence purposes without first obtaining the consent in writing of the owners or duly authorized agents of said owners owning a majority of the frontage of the property on both sides of the street in the block in which such billboard or signboard is to be erected, constructed or located. Such written consents shall be filed with the Commissioner of Buildings before a permit shall be issued for the erection, construction or location of such billboard or signboard.

916. Penalty.) Any person, firm or corporation owning, operating, maintaining or in charge, possession or control of any billboard or signboard within the city, who shall neglect or refuse to comply with the provisions of this article, or who erects, constructs or maintains any billboard or signboard that does not comply with the provisions of this article in all cases where no specific penalty is fixed herein, shall be fined not less than twenty-five (\$25.00) dollars nor more than two hundred (\$200.00) dollars for each offense; and each day on which such person shall permit or allow any billboard or signboard owned, operated, maintained or controlled by him to be erected, constructed or maintained in violation of any of the provisions of this article shall constitute a separate and distinct offense.

917. Fences—Permit Fee.) It shall be unlawful for any person, firm or corporation to erect or construct any fence within the city limits without first obtaining a permit from the Commissioner of Buildings. No wooden

fence shall be constructed of greater height than eight feet above the sidewalk grade or eight feet above the surface of the ground where no grade is established. The fee to be charged for permits for the erection or construction of fences shall be one dollar for each one hundred lineal feet of fence.

918. Fences—Walls—Height of—Wind Resistance.) No wooden fence shall be constructed of greater height than eight feet above the sidewalk grade or eight feet above the surface of the ground where no grade is established. No fence of any other material shall be constructed on a lot alongside a street or alley or within eight feet of such street or alley and parallel thereto of greater height than eight feet above the surface of the street or alley where a grade is established or eight feet above the surface of the street or alley where no grade is established. No single or isolated wall of any material whatever, which forms no part of a building or structure that may be lawfully erected, shall be constructed upon any portion of a lot where the distance from such wall to the lot line is less than the height of the wall, unless such isolated wall shall have lateral supports on at least one side of same with braces extending to the top of the wall and is so constructed that it shall be capable of resisting a horizontal wind pressure on every part of same twice as great as buildings under the provisions of this ordinance must be designed to resist.

In all cases where a fence or wall has been or shall hereafter be erected contrary to the provisions of this section, the Commissioner of Buildings shall forthwith notify the owner or agent of the land on which same is located, or the contractor engaged in erecting same, and shall specify briefly in such notice in what manner such fence or wall violates the provisions of this section, and the said Commissioner of Buildings shall require the person so notified to forthwith make such fence or wall conform to and comply with the provisions of this section, specifying in such notice the time within which such work shall be done.

If at the expiration of the time set forth in the notice provided for in this section, the person so notified shall have refused, neglected or failed to comply with the request made in such notice and shall not have torn down or changed the said fence or wall so as to conform to and comply with the provisions of this section, the Commissioner of Buildings shall have authority and it shall be his duty to proceed forthwith to tear down, or cause to be torn down, such fence or wall or so much thereof as is being maintained or shall have been erected and constructed in violation of the provisions of this section, and the cost of such tearing down shall be charged to and recovered from the owner of such fence or wall or from the person for whom such fence or wall have been or is being erected.

(See Special Ruling VII, Page 323.)

919. Illuminated and Other Roof Signs of Steel Skeleton Construction—Definition—General Requirements—Fees.) (a) Illuminated and other roof signs regulated by this section shall be defined as signs constructed, erected and maintained upon or over the roof of any building which have all or any part of its letters of which said signs may be constructed either in an outline of incandescent lamps or which have painted, flush or raised letters where the face of the sign presents a surface to be affected by wind pressure not in excess of the requirements hereinafter contained; or signs having a border of incandescent lights attached thereto and reflecting light thereon; or transparent glass signs where they are lighted by electricity or other illuminant. Every such sign as hereinabove described shall be constructed with steel skeleton construc-



TORONTO STAR, TORONTO, CAN.

Chapman and Oxley
Architects

Thompson-Starrett Co., Ltd.
General Contractors

Thompson-Starrett Company, Inc.

**BUILDING
CONSTRUCTION**

CHICAGO

::

NEW YORK

IN CANADA **Thompson-Starrett Co., Ltd.** TORONTO

tion so as to present a surface to be affected by wind pressure which shall not exceed fifty per cent. of the face of the sign. No illuminated roof sign shall be erected or maintained upon or over the roof of any building unless the framework thereof shall be entirely of metal or some other equally incombustible material, and no material, except such material as is used for insulating wires and conductors, which is less combustible than metal, shall be used in, on or about, or comprise a part of any illuminated roof sign, except that the material to which the framework or any such sign shall be anchored, may be substantial beams anchored or securely fastened to the roof or walls of the buildings upon or over which any such sign is erected.

(b) The distance between the roof of said building or structure and the lower edge of such sign shall not be less than five (5) feet. The height of any such sign from the roof of the building or structure to which the same is anchored or attached shall not exceed sixty (60) feet. No such sign, hereafter erected, shall be constructed closer than six (6) feet from the edge of the roof of the building or structure upon which same is erected. No such illuminated roof sign shall be constructed on any building or structure which is over eight stories in height. In case of illuminated roof signs less than twelve (12) feet in height, the permit fees and inspection fees shall be the same as for billboards, and signboards and the provisions for such fees in this section shall not apply. No illuminated roof sign, such as is described in this section, shall be constructed, erected, maintained or put in place until the person, firm or corporation desiring to construct, erect, maintain or put in place such sign shall have made application in writing to the Commissioner of Buildings for permission so to do, submitting with such application plans and specifications showing the size, nature and construction of the sign proposed to be erected, and shall present to the City Electrician plans showing the insulation, location and construction of the electrical part of such sign. If the Commissioner of Buildings shall be of the opinion that such sign, if erected, constructed and maintained in accordance with the plans and specifications so submitted, shall be safe and secure, he shall approve the application so submitted, providing the plans bear the approval of the City Electrician, and the Commissioner of Buildings shall note his approval upon such plans and specifications and keep a copy thereof at all times on file in his office. All signs shall be constructed, erected and maintained of sufficient strength to withstand a wind pressure of not less than thirty pounds per square foot of surface without stressing the material beyond the safe limits of stress given elsewhere in this chapter. It shall be the duty of the Commissioner of Buildings to cause his building inspector or inspectors to make an inspection annually of each illuminated roof sign erected or constructed or being maintained under the provisions of this ordinance for the purpose of ascertaining whether such sign is safely and securely constructed and so anchored and fastened to the building or structure; provided, however, that the provisions of this section shall not apply to the erection, construction and maintenance of signboards and billboards as regulated by the ordinances of the City of Chicago.

(c) Any person, firm or corporation desiring to erect or maintain an illuminated roof sign, as described in this section, shall pay to the city, to cover the cost of inspection and approval by the Commissioner of Buildings of the plans and specifications of such sign, when erected, a fee of fifty dollars for the first five hundred square feet

of superficial area of such sign or fractional part thereof, and five cents for each additional square foot. For each annual inspection of any illuminated roof sign by the Commissioner of Buildings, subsequent to the first inspection, there shall be paid a fee of fifty dollars for the first five hundred square feet or fractional part; five cents additional for each additional square foot area over five hundred square feet. In addition to the fees herein required to be paid for inspection, there shall be paid by the owner or person having charge or control of any illuminated roof sign, as herein described, an annual inspection fee to cover the cost of such inspection, which shall be made by the Commissioner of Gas and Electricity, whose duty it shall be to cause such annual inspection to be made, and such fee shall be at the rate provided by the ordinances of the city.

(d) Every illuminated roof sign erected, constructed or maintained under the provisions of this ordinance shall have the name of the owner thereof placed thereon in a legible and conspicuous manner. No person, firm or corporation shall be permitted to erect or maintain an illuminated roof sign unless he shall execute and file with the City Clerk of Chicago, with sureties to be approved by the Commissioner of Buildings, a bond to the City of Chicago in the penal sum of fifteen thousand dollars (\$15,000.00), conditioned to indemnify, save and keep harmless the City of Chicago, and its officers and agents, from any damage which it, the said city, or any of said officers, may suffer, or from any costs, liability or expense of any kind whatsoever which it, the said city, or any of its officers, may be put to or which may be recovered against the said city, or any of its officers, from or by reason of the construction, erection and maintenance of such sign, and conditional further to faithfully observe and perform all the provisions and conditions of this article and of any ordinance now in force or which may hereafter be passed by the City Council of the City of Chicago, relating to or governing the erection, maintenance, use or inspection of illuminated roof signs.

(e) The permission and authority granted by this article shall cease at any time hereafter at the discretion of the Mayor. In case of the termination of the privileges herein granted by the exercise of the Mayor's discretion as aforesaid, all such electrical signs erected by virtue of the authority conferred by this article, shall be removed at the expense of the owner or owners of the building or the person, firm, corporation or individual who are then maintaining same without any cost or expense of any kind whatsoever to the City of Chicago, provided that in the event of the failure, neglect or refusal on the part of the owner of the building or structure upon which said illuminated electric sign is constructed or the person, firm, corporation or individual operating and maintaining said electric sign to remove said electric sign upon the revocation of the permit by the Mayor as herein provided, the Commissioner of Buildings may proceed to remove same and charge the expense thereof to the owner of the building or structure upon which said illuminated electric sign is constructed or to the person, firm, corporation or individual operating or maintaining same.

(f) Any person, firm or corporation who shall erect, construct or maintain an illuminated roof sign in violation of any of the provisions of this section shall be fined not less than fifty dollars (\$50.00), nor more than two hundred dollars (\$200.00) for each offense.

920. **Definition of Word "Block."** Whenever a provision is made in this chapter that frontage consents shall be obtained for the



State Bank of Chicago Building, Monroe and La Salle Streets
Graham, Anderson, Probst & White, Architects.

Chicago, Illinois

LANQUIST CONSTRUCTION CO.

Successors to Lanquist & Illsley Co.

BUILDERS

Telephones:
Lincoln 6378
Lincoln 6379

1100 North Clark St.
CHICAGO

erection, construction, alteration, enlargement or maintenance of any building or structure in any block, the word "block," so used, shall not be held to mean a square, but shall be held to embrace only that part of a street bounding the square which lies between the two nearest intersecting streets one on either side of the point at which such building or structure is to be erected, constructed, altered, enlarged or maintained, unless it shall be otherwise specially provided.

ARTICLE XXIV. Frontage Consents.

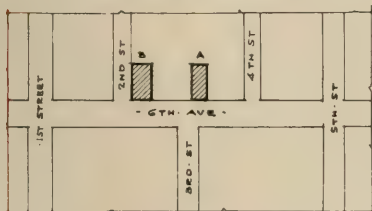


Fig. 52.

921. Frontage Consents—Where Required—Uses of Property for Required—Consent in Writing.) It shall be unlawful for any person, firm or corporation to locate, build, construct or maintain on any lot fronting on any street or alley in the City in any block in which one-half of the buildings on both sides of the street are used exclusively for residence purposes, or within fifty feet of any such street, any building, structure or place used for a gas reservoir, manufacture of gas, stock yards, slaughter house, packing house, smoke house or place where fish or meats are smoked or cured, soap factory, glue factory, size or gelatine manufactory, renderies, fertilizer manufactory, tannery, storing or scraping of raw hides or skins, lime kiln, cement or plaster of Paris manufactory, oil cloth or linoleum manufactory, rubber manufactory from the crude material, saw or planing mill, wood working establishment, starch factory, glucose or dextrine manufactory, textile factory, laundry run by machinery, factory combined with a foundry, iron or steel works, brass or copper works, sheet metal works, blacksmithing or horseshoeing shop, boiler making, foundry, smelter, metal refinery, machine shop, stone or monument works run by machinery, asphalt manufactory or refining, paint and varnish factory, oil or turpentine factory, printing ink factory, tar distillation or manufactory, tar roofing, tar paper or tarred fabric manufactory, ammonia or chlorine or bleaching powder factory, celluloid manufactory, place for the distillation of wood or bones, lamp black factory, sulphurous acid, sulphuric acid, nitric or hydrochloric acid manufactory, factories or other manufacturing establishments using machinery or emitting offensive or noxious fumes, odors or noises, storage warehouses storing or baling of junk or scrap paper or rags, shoddy manufactory or wool scouring, second-hand store or yard, incineration or reduction of garbage or offal, dead animals or refuse, stable for more than five horses, medical dispensary, livery stable, sale stable, boarding stable, without the written consent of a majority of the property owners according to frontage on both sides of such street or alley. Such written consent shall be obtained and filed with the Commissioner of Buildings before a permit is issued for the construction or alteration of any building, structure or place for any of the above purposes: provided, that in determining whether one-half of the buildings on both sides of the street are used exclusively for residence purposes any building fronting

upon another street located upon a corner lot shall not be considered.

922. Reformatories—Sheltering Institutions.) It shall be unlawful for any person, firm or corporation to build, construct, maintain, conduct or manage any reformatory, rescue or sheltering institution in any block or square in which one-half of the buildings on both sides of the street or streets on which the proposed reformatory, rescue or sheltering institution or the grounds thereof may have frontage, are used exclusively for residence purposes without the written consent of a majority of the property owners, according to frontage on both sides of the streets bounding such square. Such written consent shall be obtained and filed with the Commissioner of Buildings before a permit is issued for the construction, alteration, or maintenance of such building. Provided, that in determining whether one-half of the buildings on both sides of the street are used exclusively for residence purposes, any building fronting upon another street and located upon a corner lot shall not be considered.

923. Permit For Moving Frame Buildings—Requirements—Written Consents—Space Occupied on lot.) (a) No person, firm or corporation shall be permitted to move any building which has been damaged to an extent greater than 50 per cent of its value by fire, decay or otherwise; nor shall be permitted to move any frame building of such character as is prohibited to be constructed within the fire limits from any point outside the fire limits to any point within the fire limits; nor shall it be permissible to move any building to a location at which the uses for which such building is designed are prohibited by ordinance. Permits for the moving of frame buildings other than those the moving of which is herein prohibited, shall be granted upon the payment of a fee of ten cents for each one thousand cubic feet of volume or fractional part thereof of such building, and securing and filing the written consent of two-thirds of the property owners according to frontage on both sides of the street in the block in which such building is to be moved. No permit shall be issued to move any building used or designed to be used for purposes for which frontage consents are required until frontage consents in the block to which such building is to be moved have also been secured and filed as required by the ordinances relating to such use.

(b) No building used for residence or tenement house purposes shall be moved from one lot to another or from one location to another upon the same lot unless the space to be occupied on such lot shall comply with the provisions of Section 642 of this chapter.

(c) No frontage consent shall be required of any person, firm or corporation for removing a building upon his own premises and not going upon the premises of any other person, or upon any street, alley or other public place, in making such removal.

924. Amusements—Frontage Consents Required.) It shall be unlawful for any person, firm or corporation to construct or erect any building or structure designed or intended to be used for the purpose of presenting or carrying on therein any entertainment for which a license is required by the ordinances of the City of Chicago or to devote any grounds or place to such purposes without first obtaining the written consent of the property owners as required by the City ordinances.

925. Buildings for the Storage of Shavings, Sawdust and Excelsior—Frontage Consents.) It shall be unlawful for any person, firm or corporation to construct or erect any building designed or intended to be used for the purpose of storing shavings, sawdust or excelsior therein within the city without

H. B. BARNARD

BUILDER

140 South Dearborn Street

CHICAGO

first obtaining the written consent of the property owners as required by the City ordinances.

926. Frontage Consents — Business of Selling Provisions, Etc., in Residence Districts.) It shall be unlawful for any person, firm or corporation to carry on the business of selling meats, poultry, fish, butter, cheese, lard, vegetables or any other provisions from any place of business located in any block in which all the other buildings are used exclusively for residence purposes, without first securing and filing with the City Collector the written consent of three-fourth of the property owners according to frontage on both sides of the street in the block in which the building to be thus used is located, provided in determining whether all the buildings in said block are used exclusively for residence purposes, any building fronting on another street and located upon a corner shall not be considered. In case a permit for building a store for such purposes in such block, or converting a building to store purposes in such block is applied for, the frontage consents required by this section shall be filed with the Commissioner of Buildings.

927. Business of a Store—Requirements as to a Permit for Erection.) No permit shall be issued for the erection or remodeling of any building in any block in which the use of buildings is restricted or regulated by ordinance if such building is designed to be used for conducting therein any business or store, without first requiring the applicant for such permit to file with the Commissioner of Buildings a plat showing the use to which all the property in such block is devoted.

928. Withholding of Building Permit—Protest of Property Owners—Public Hearing—Definition of Word "Square".) In all cases where an application for a permit is made for the erection of a new building in any square in which a majority of the buildings are used exclusively for residence purposes, or in a square on the opposite side of the street from such square so used for residential purposes; if there shall be filed with the Commissioner of Buildings a protest signed by not less than ten owners of property in such square so used for residential purposes, or in case the ownership of the frontage is in less than twenty persons then by a majority of the owners according to frontage, the Commissioner of Buildings shall withhold the issuance of the permit until the City Council shall have ordered a public hearing similar to that required in an act of the general assembly entitled "An Act to confer certain additional powers upon city councils in cities and presidents and boards of trustees in villages and incorporated towns concerning buildings and structures, the intensity of use of lot areas, the classification of trades, industries, buildings and structures with respect to location and regulations, the creation of districts of different classes, and the establishment of regulations and restrictions applicable thereto," in force June 28, 1921. For the purposes of this section a square shall be understood to be a plot of ground containing city lots surrounded by public streets, railway right of way, natural boundaries, or public places or thoroughfares.

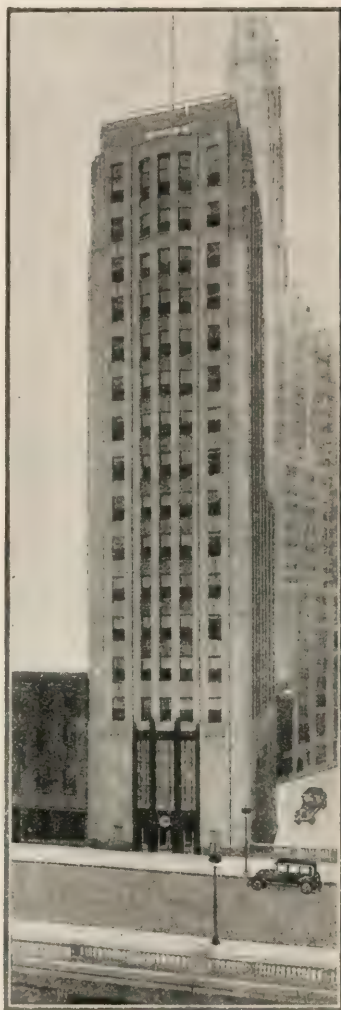
929. Garages — Frontage Consents Required.) No person, firm or corporation shall keep, conduct or operate a garage in this city without first obtaining a license so to do in the manner provided for in this ordinance; and it shall not be lawful for any person, firm or corporation to locate, build, construct or maintain any garage within the territory bounded by the Chicago River and the south branch thereof on the north and west, by Lake Michigan on the east and by Van Buren Street on the south, any part of which is within eighty feet, or the entrance

or exit to or from which, for the use of automobiles, is within one hundred and sixty feet of any portion of the street front of any building used as and for a hospital, church or public or parochial school, or such entrance or exit of which is upon a street containing street car tracks and within one block of the entrance of a street railway tunnel, or which shall house within said distance of one hundred and sixty feet of such street front, more than seventy-five cars. It shall not be lawful to locate, build, construct or maintain any garage within two hundred feet of any building used as and for a hospital, church or public or parochial school, or a passenger terminal depot or station of a steam or electric railroad, or the grounds thereof, in any portion of the City of Chicago outside of the territory above named, nor shall any person, firm or corporation hereafter locate, build, construct or establish any garage in the city, on any lot in any block in which dwelling houses, apartment houses and hotels constitute one-half or more of the buildings on both sides of the street in the block, or within one hundred feet of any such street in any such block without the written consent of a majority of the property-owners according to frontage on both sides of the street; provided, that all lots which abut only on a public alley or court shall be considered as fronting on the street to which such alley or court leads. It shall not be deemed inconsistent with the character of a building as a dwelling house, apartment house or hotel under this section that a part thereof is used for retail business purposes, if a separate part of such building with a total floor area greater than the floor area used for business, is used for residence purposes. Frontage consents, when required under this section, shall be obtained and filed with the commissioner of buildings before a permit is issued for the construction of any such building; provided, that in determining whether dwelling houses, apartment houses and hotels constitute one-half or more of the buildings on both sides of the street in any block, any building fronting upon another street and located upon a corner lot shall not be considered; and provided, further, that the word "block" as used in this section, shall not be held to mean a square but shall be held to embrace only that part of the street in question which lies between the two nearest intersecting streets.

930. Hospital or Home frontage consents.) It shall be unlawful for any person, firm, association or corporation to build, construct, maintain, conduct or manage a hospital, or a home, as defined in chapter XXXIX of this ordinance, in any block in which two-thirds of the buildings fronting on both sides of the street or streets on or along which the proposed hospital or home may face are devoted exclusively to residence purposes, unless the owners of a majority of the frontage in such block and the owners of a majority of the frontage on the opposite side or sides of the street or streets on or along which said building faces consent in writing to the building, construction or maintaining, managing or conducting of any such hospital or home in such block; provided, however, that no new frontage consents shall be required if such hospital or home has heretofore been licensed by the city of Chicago as a hospital, home or nursery at the present location. Such written consents of the majority of said property owners shall be filed with the commissioner of health before a permit shall be granted for the building or construction of any such hospital or home, and before a license shall be issued for the maintaining, conducting or managing of any such hospital or home.

931. Undertaking establishment frontage consents.) It shall be unlawful for any person, firm or corporation to establish or main-

Chicago Motor Club



Holabird & Root,
Architects



HENRY ERICSSON CO.

General Contractors

228 N. LaSalle St.

Chicago

tain a morgue or to carry on the business of an undertaker, as defined in chapter XXXIX of this ordinance, that receives in connection with such business, at his, their or its place of business, the body of any dead person for embalming or other purposes, on or along any boulevard or pleasure driveway, without the written consent of a majority of the property owners according to the frontage on both sides of such boulevard or pleasure driveway in the block in which such morgue or place of business is located; it shall also be unlawful for any person, firm or corporation to establish or maintain a morgue or to carry on the business of an undertaker, as defined in chapter XXXIX of this ordinance, that receives, in connection with such business, at his, their or its place of business, the body of any dead person for embalming or other purposes, on or along any street in any block in which two-thirds of the buildings on both sides of the street are used exclusively for residence purposes, without the written consent of a majority of the property owners according to the frontage on both sides of such street in such block; provided that nothing herein contained shall apply to such location in the case of any person licensed as an undertaker and authorized to carry on such business at any such location at the time of the passage of this ordinance nor to any block in any street on which street cars are operated. Such frontage consents shall be obtained and filed with the department of health before a license shall issue for such business.

932. Ice Plant Frontage Consents.) It shall be unlawful for any person, firm or corporation to locate, establish, conduct or maintain any ice-making house or cooling plant, or any buildings used for the storage of ice, in any block in which two-thirds of the buildings fronting on both sides of the street on which the proposed plant shall be located are devoted exclusively to residence purposes, unless the owners of the majority of the frontage in said block on both sides of the street on which said plant is located shall consent in writing to the location, establishment, conducting or maintenance of such plant in such block. Such written consents of the majority of said property owners shall be filed with the Commissioner of Buildings before a permit shall be granted for the building or construction of any such ice-making house or cooling plant. Any person, firm or corporation violating any of the provisions of the section, or refusing, failing or neglecting to comply with any of the said provisions, shall be fined not less than five dollars nor more than one hundred dollars for each offense, and a separate offense shall be regarded as having been committed for each day during which such violation shall continue.

933. Frontage consents—general requirements.) Whenever frontage consents are required, for the construction of a building or for any occupation for which a building is about to be constructed or altered; under any section of this ordinance or under any other ordinance of the city, such frontage consents shall be presented to the commissioner of buildings before the issuance of a permit for the erection or alteration of a building for such purpose. Unless otherwise specified the provisions of this chapter in such case shall apply as to the definition of the word "block," whenever such word is used in provisions requiring frontage consents.

Note: The whole of Article XXIV A—**Ventilation**—was repealed January 5, 1929, pp. 4244 to 4246, and the work thereunder transferred to the Health Department, and designated as Chapter XXXIX, Article XXXV, Sections 2152, 2153 and 2154, of the Code of 1922.

ARTICLE XXV.

Fire Limits.

934. Fire limits and provisional fire limits.)

(a) The fire limits of the city of Chicago within which wooden buildings shall not be erected, shall be and they are hereby defined as follows: all that part of the city of Chicago bounded by the following limits: beginning at the intersection of the shore of Lake Michigan and the center line of Rogers avenue, thence southwesterly along the center line of Rogers avenue to the east line of the right of way of the Chicago and North Western Railway Company, then south along the east line of said right of way of the Chicago and North Western Railway Company to a line 125 feet north of the north line of Foster avenue, thence west along said line 125 feet north of the north line of Foster avenue to the center line of the North Shore channel, thence southeasterly along the center line of said North Shore channel to the center line of the North branch of the Chicago river, thence northwesterly and westerly along the center line of said North branch of the Chicago river to a line 125 feet west of the west line of north Kedzie avenue, thence south along said line 125 feet west of the west line of north Kedzie avenue, to a line 125 feet south of the south line of Irving Park boulevard, thence east along said line 125 feet south of the south line of Irving Park boulevard to the center line of the north branch of the Chicago river, thence northerly along the center line of the north branch of the Chicago river to the center line of Berteau avenue, thence east along the center line of Berteau avenue to a line 125 feet west of the west line of north Western avenue, thence south along said line 125 feet west of the west line of north Western avenue to the center line of Addison street, thence east along the center line of Addison street to the center line of north Western avenue, thence south along the center line of north Western avenue to the center line of Belmont avenue, thence east along the center line of Belmont avenue to the center line of Southport avenue, thence south along the center line of Southport avenue to the center line of Fullerton avenue, thence west along the center line of Fullerton avenue to the center line of the North Branch of the Chicago river, thence northwesterly along the center line of the North Branch of the Chicago river to a line 125 feet north of the north line of Belmont avenue thence west along said line 125 feet north of the north line of Belmont avenue to a line 125 feet west of the west line of north Kostner avenue, thence south along said line 125 feet west of the west line of north Kostner avenue to a line 125 feet north of the north line of Diversey avenue, thence west along said line 125 feet north of the north line of Diversey avenue, to a line 125 feet west of the west line of north Cicero avenue, thence south along said line 125 feet west of the west line of north Cicero avenue to the center line of west Fullerton avenue, thence west along the center line of Fullerton avenue to the center line of north Laramie avenue, thence south along the center line of north Laramie avenue to a line 125 feet northeasterly of the northeasterly line of west Grand avenue, thence northwesterly along said line 125 feet northeasterly of the northeasterly line of west Grand avenue to the center line of Harlem avenue, thence south along the center line of Harlem avenue to a line 125 feet southwesterly of the southwesterly line of west Grand avenue, thence southeasterly along said line 125 feet southwesterly of the southwesterly line of west Grand avenue to a line 125 feet south of the south line of Armitage avenue, thence east along said line 125 feet south of the south line of Armitage avenue to a line 125 feet southwesterly of the southwesterly line



Hospital Building, Chicago State Hospital, Danmaring, Ill.

State of Illinois, Owners

Wm. J. Lindstrom, Supervising Architect

C. A. MOSES CONSTRUCTION CO.

General Contractors

TELEPHONES

State 2604-2605

1440 Midland Building

CHICAGO

of west Grand avenue, thence southeasterly along said line 125 feet southwesterly of the southwesterly line of west Grand avenue to the southerly line of the right of way of the Chicago, Milwaukee and St. Paul Railway Company, thence northwesterly and westerly along the southerly line of the said right of way of the Chicago, Milwaukee & St. Paul Railway Company to the center line of Narragansett avenue, thence south along the center line of Narragansett avenue to the center line of west North avenue, thence east along the center line of west North avenue to the center line of north Austin avenue, thence south along the center line of north Austin avenue to the center line of west Roosevelt road, thence east along the center line of west Roosevelt road to the center line of south Kenton avenue produced north, thence south along the center line of south Kenton avenue produced north and the center line of south Kenton avenue to the center line of west 39th street produced west, thence east along the center line of west 39th street produced west to the center line of the Illinois and Michigan canal, thence northeasterly along the center line of the Illinois and Michigan canal to the center line of south Western avenue boulevard, thence south along the center line of south Western avenue boulevard to the center line of west 39th street, thence east along the center line of west 39th street to the center line of south Robey street, thence south along the center line of south Robey street to the center line of west 43rd street, thence east along the center line of west 43rd street to a line 125 feet west of the west line of south Ashland avenue, thence north along said line 125 feet west of the west line of south Ashland avenue to the center line of west 41st street, thence east along the center line of west 41st street to the center line of south Ashland avenue, thence north along the center line of south Ashland avenue to the center line of west 40th street, thence east along the center line of west 40th street to a line 125 feet east of the east line of south Ashland avenue thence south along said line 125 feet east of the east line of south Ashland avenue to the center line of west 43rd street, thence west along the center line of west 43rd street to the center line of south Ashland avenue, thence south along the center line of south Ashland avenue to the center line of west 47th street, thence east along the center line of west 47th street to a line 125 feet west of the west line of south Halsted street, thence south along said line 125 feet west of the west line of south Halsted street to the center line of west 51st street, thence west along the center line of west 51st street to the center line of south Racine avenue, thence south along the center line of south Racine avenue to a line 125 feet north of the north line of west 63rd street, thence west along said line 125 feet north of the north line of west 63rd street to the center line of south Western avenue, thence north along the center line of south Western avenue and south Western avenue boulevard to the center line of west 45th street, thence west along the center line of west 45th street and west 45th street produced west to the center line of south Cicero avenue, thence south along the center line of south Cicero avenue to the center line of west 51st street, thence west along the center line of west 51st street to the southerly line of the right of way of the Chicago and Alton Railroad and thence southwesterly along said southerly line of the right of way of the Chicago and Alton Railroad to the center line of south Harlem avenue, thence south along the center line of south Harlem avenue to the center line of west 59th street, thence east along the center line of west 59th street to the center line of south Narragansett avenue, thence south along the center line of south Narragansett avenue and

Narragansett avenue produced south to the center line of west 65th street produced west, thence east along the center line of west 65th street produced west and west 65th street to the center line of south Cicero avenue, thence south along the center line of south Cicero avenue to the center line of west 69th street produced west, thence east along the center line of west 69th street produced west and west 69th street to the center line of south Western avenue, thence north along the center line of south Western avenue to a line 125 feet south of the south line of west 63rd street, thence east along the said line 125 feet south of the south line of west 63rd street to the center line of south Racine avenue, thence south along the center line of south Racine avenue to the center line of west 75th street, thence west along the center line of west 75th street to a line 125 feet east of the east line of south Ashland avenue, thence north along said line 125 feet east of the east line of south Ashland avenue to the center line of west 71st street, thence west along the center line of west 71st street to a line 125 feet west of the west line of South Ashland avenue, thence south along said line 125 feet west of the west line of south Ashland avenue to the center line of west 75th street, thence west along the center line of west 75th street and west 75th street produced to the center line of south Cicero avenue, thence south along the center line of south Cicero avenue to the center line of west 87th street, thence east along the center line of west 87th street to the center line of south Western avenue, thence south along the center line of south Western avenue to the center line of west 99th street, thence west along the center line of west 99th street to the center line of south California avenue, thence south along the center line of south California avenue to the center line of west 115th street, thence east along the center line of west 115th street to the center line of south Western avenue, thence south along the center line of south Western avenue to the center line of west 119th street, thence east along the center line of west 119th street to the center line of Vincennes avenue, thence northeasterly along the center line of Vincennes avenue to the center line of west 103rd street, thence east along the center line of west 103rd street to the center line of south Halsted street, thence north along the center line of south Halsted street to a line 125 feet south of the south line of west 95th street, thence east along said line 125 feet south of the south line of west 95th street to the center line of Eggleston avenue, thence north along the center line of Eggleston avenue and Eggleston avenue produced north to a line 125 feet south of the south line of west 83rd street, thence east along said line 125 feet south of the south line of west 83rd street to a line 125 feet east of the east line of Stewart avenue, thence south along said line 125 feet east of the east line of Stewart avenue and Stewart avenue produced south to a line 125 feet north of the north line of west 95th street, thence east along said line 125 feet north of the north line of west 95th street to a line 125 feet west of the west line of south State street, thence south along said line 125 feet west of the west line of south State street to a line 125 feet south of the south line of west 99th street, thence east along a line 125 feet south of the south line of west and east 99th street to a line 125 feet west of the west line of south Michigan avenue, thence south along said line 125 feet west of the west line of south Michigan avenue to a line 125 feet north of the north line of east 119th street, thence west along a line 125 feet north of the north line of east and west 119th street to a line 125 feet west of the west line of south Morgan street, thence south along said line 125 feet west of the



1325 Astor St., Chicago
Rebore, Wentworth, Dewey & McCormick, Inc.
A. N. Rebore, Architect

DAHL-STEDMAN CO.

BUILDERS

**11 SOUTH LA SALLE STREET
CHICAGO, ILL.**

TELEPHONE RANDOLPH 0380

west line of south Morgan street to a line 125 feet south of the south line of west 119th street, thence east along a line 125 feet south of the south line of west and east 119th street to a line 125 feet east of the east line of south Michigan avenue, thence north along said line 125 feet east of the east line of south Michigan avenue to a line 125 feet south of the south line of east 99th street, thence east along said line 125 feet south of the south line of east 99th street to a line 125 feet west of the west line of South Park avenue, thence south along said line 125 feet west of the west line of South Park avenue to the center line of east 115th street, thence east along the center line of east 115th street to the northeasterly line of the right of way of the Michigan Central Railroad Company, thence south and southeasterly along said northeasterly line of the right of way of the Michigan Central Railroad Company to the center line of east 127th street, thence east along the center line of east 127th street to the shore line of Lake Calumet, thence northwesterly and northeasterly along the shore line of said Lake Calumet to a line 125 feet east of the east line of Stony Island avenue, thence north along said line 125 feet east of the east line of Stony Island avenue to a line 125 feet north of the north line of east 95th street, thence west along said line 125 feet north of the north line of east 95th street to a line 125 feet east of the east line of the right of way of the Illinois Central Railroad Company, thence northeasterly along said line 125 feet east of the east line of the right of way of the Illinois Central Railroad Company to the center line of east 83rd street, thence east along the center line of east 83rd street to the east line of the right of way of the New York, Chicago and St. Louis Railroad, thence south and southeast along said east line of the right of way of the New York, Chicago and St. Louis Railroad to the center line of east 87th street, thence east along the center line of east 87th street to the center line of Jeffery avenue, thence north along the center line of Jeffery avenue to the southwest line of the right of way of the Lake Shore and Michigan Southern Railway, thence southeast along said southwest line of the right of way of the Lake Shore and Michigan Southern Railway to a line 125 feet west of the west line of Yates avenue, thence north along said line 125 feet west of the west line of Yates avenue to a line 125 feet south of the south line of east 83rd street, thence east along said line 125 feet south of the south line of east 83rd street to the center line of Yates avenue, thence north along the center line of Yates avenue to a line 125 feet south of the south line of east 79th street, thence east along said line 125 feet south of the south line of east 79th street to the center line of Brandon avenue, thence south along the center line of Brandon avenue to the center line of east 83rd street, thence east along the center line of east 83rd street to the center line of Burley avenue, thence south along the center line of Burley avenue, to the center line of east 89th street, thence west along the center line of east 89th street to a line 125 feet west of the west line of Manistee avenue, thence south along said line 125 feet west of the west line of Manistee avenue to the northeasterly line of the right of way of the Lake Shore and Michigan Southern Railway, thence southeasterly along said northeasterly line of the right of way of the Lake Shore and Michigan Southern Railway to the easterly and southeasterly line of the South Chicago branch of the Pittsburgh, Ft. Wayne and Chicago Railroad Company, thence southwesterly along said easterly and southeasterly line of the South Chicago branch of the Pittsburgh, Ft. Wayne and Chicago Railroad Company to the center line

of east 106th street, thence east along the south line of east 106th street to a line 200 feet east of the east bank of the Calumet river, thence northerly along said line 200 feet east of the east bank of the Calumet river to the center line of east 95th street, thence east along the center line of east 95th street to the shore of Lake Michigan, thence northerly and northwesterly along the shore of Lake Michigan to the place of beginning.

All that part of the City of Chicago bounded by the following limits is hereby included within the fire limits of the City of Chicago: Commencing at the intersection of the center line of West 95th street and South Ashland avenue thence west along the center line of West 95th street to the right of way of the suburban branch of the Chicago, Rock Island and Pacific Railroad Company, thence north along the right of way of the suburban branch of the Chicago, Rock Island and Pacific Railroad Company to the center line of West 90th street, thence east along the center line of East 90th street to its intersection with the center line of South Ashland avenue, thence south along the center line of South Ashland avenue to the intersection of the center line of West 95th street or the place of beginning.

(b) Also beginning at the intersection of the center line of Addison street and the center line of the North Branch of the Chicago river, thence west along the center line of Addison street to the center line of north Whipple street, thence south along the center line of north Whipple street to the center line of Elston avenue, thence southeasterly along the center line of Elston avenue to the center line of Roscoe street, thence east along the center line of Roscoe street to the center line of the North Branch of the Chicago River, thence north along the center line of the North Branch of the Chicago river to the place of the beginning.

Also beginning at the intersection of the east line of the right of way of the Chicago & Northwestern Railway Company and a line 125 feet north of the north line of Foster avenue; thence west along said line 125 feet north of the north line of Foster avenue to the center line of the North Shore Channel of the Sanitary District Canal; thence northwesterly along the center line of said North Shore Channel to the center line of Devon avenue; thence east along the center line of Devon avenue to the center line of North Kedzie avenue produced north; thence North along the center line of North Kedzie avenue produced north to the center line of Howard street produced west; then east along said center line of Howard street produced west and Howard street to the east line of the right of way of the Chicago & Northwestern Railway; thence southeasterly and southerly along the said east line of the right of way of the Chicago & Northwestern Railway to the place of beginning.

Also beginning at the intersection of West 69th street and South California avenue; thence south along the center line of South California avenue to the center line of West 75th street; thence east along the center line of West 75th street to the center line of Irving avenue; thence north along the center line of Irving avenue to the center line of West 69th street; thence west along the center line of West 69th street to the place of beginning.

Also, beginning at the intersection of the center line of North Harlem avenue and Addison street, thence east along Addison street to the center line of North Tripp avenue; thence north along the center line of North Tripp avenue to the center line of Montrose avenue; thence east along the center line of Montrose avenue to the center line of North Crawford avenue; thence north along the center line of North Crawford avenue to the North Branch of the Chicago River; thence northwesterly along the



Horder's, Inc., Quincy and Jefferson Sts., Chicago

S. N. Crowen, Architect

George Thomson & Son Co.

Incorporated 1901

Building Construction



Telephone Franklin 4316-17-18-19

**30 NORTH LA SALLE STREET
CHICAGO**

North Branch of the Chicago River to the center line of Bryn Mawr avenue; thence west along the center line of Bryn Mawr avenue to the center line of North Austin avenue; thence south along the center line of North Austin avenue to the center line of Irving Park boulevard; thence west along the center line of Irving Park Boulevard to the center line of North Harlem avenue; thence south along the center line of North Harlem avenue to the place of beginning.

Amendment of May 7, 1924, and further amended (June 18, 1924) to take effect on January 1, 1925; further amended to take effect July 1, 1925, and further amended to take effect January 1, 1926.

Also commencing at the intersection of the center line of East 67th street with the center line of South Park avenue, thence west along the center line of East 67th street to its intersection with the center line of South State street, thence south along the center line of South State street to its intersection with the center line of East 75th street, thence east along the center line of East 75th street to its intersection with the center line of South Park avenue, thence north along the center line of South Park avenue to the place of beginning.

Also commencing at the intersection of the center line of West 83rd street and the easterly line of the right of way of the Chicago, St. Louis and Pittsburgh Railroad Company; thence southeasterly along said easterly line to its intersection with the center line of West 90th street; thence east along the center line of West 90th street to its intersection with the center line of South Winchester avenue; thence northerly along the center line of South Winchester avenue to its intersection with the center line of West 83rd street, and thence west along the center line of West 83rd street to the place of beginning.

Also beginning at the intersection of East 87th street and Stony Island avenue; thence south along the center line of Stony Island avenue to the center line of East 91st street; thence east along the center line of East 91st street to the center line of Colfax avenue; thence north along the center line of Colfax avenue to the right of way of the Pennsylvania Railroad; thence northwesterly along the right of way of the Pennsylvania Railroad to the center line of East 87th street; thence west along the center line of East 87th street to the place of beginning.

Beginning at the intersection of a line 125 feet south of the south line of West 95th street and the center line of Vincennes avenue, thence west along said line 125 feet south of the south line of West 95th street to the center line of Beverly avenue, thence southeasterly along the center line of Beverly avenue to the center line of Vincennes avenue, thence northeasterly along the center line of Vincennes avenue to the place of beginning.

Also beginning at the intersection of East 106th street and State Line road; thence west along the center line of East 106th street to the right of way of the South Chicago and Southern Railroad; thence south along the right of way of the South Chicago and Southern Railroad to the center line of East 108th street; thence west along the center line of East 108th street to the center line of Avenue G; thence south along the center line of Avenue G to the center line of East 110th street; thence west along the center line of East 110th street to the center line of Avenue O; thence south along the center line of Avenue O to the center line of East 114th street; thence east along the center line of East 114th street to the right of way of the South Chicago and Southern Railroad; thence north along the right of way of the South Chicago and Southern Railroad to the center line of East 112th street; thence east along the center line of East 112th street to the Illinois and Indiana State line; thence north along the Illinois and Indiana State line to the place of beginning.

Also, beginning at the intersection of the center line of North Harlem avenue and Addison street thence east along Addison street to a line 125 feet east of the east line of North Cicero avenue; thence south along said line 125 feet east of the east line of North Cicero avenue to a line 125 feet north of the north line of Diversey avenue; thence west along said line 125 feet north of the north line of Diversey avenue to a line 125 feet west of the west line of North Cicero avenue; thence south along the said line 125 feet west of the west line of North Cicero avenue to a line 125 feet south of the south line of West Diversey avenue; thence west along the said line 125 feet south of the south line of West Diversey avenue to the center line of North Harlem avenue; thence north along the center line of North Harlem avenue to the place of beginning.

Also beginning at the intersection of West Garfield boulevard and South Racine avenue; thence west along the center line of West Garfield boulevard to the center line of South Wood street; thence south along the center line of South Wood street to the center line of West 66th street; thence east along the center line of West 66th street to the center line of Loomis boulevard; thence north along the center line of Loomis boulevard to the center line of West 63rd street; thence east along the center line of West 63rd street to the center line of South Racine avenue; thence north along center line of South Racine avenue to the place of beginning.

Also beginning at the intersection of West 49th street and Loomis street; thence west along the center line of West 49th street to the center line of South Western avenue; thence south along the center line of South Western avenue to a line 125 feet north of the north line of West 63rd street; thence east along said line 125 feet north of the north line of West 63rd street to the center line of South Wood street; thence north along the center line of South Wood street to the center line of West Garfield boulevard; thence east along the center line of West Garfield boulevard to the center line of Loomis street; thence north along the center line of Loomis street to the place of beginning.

Also beginning at the intersection of a line 125 feet south of the south line of West 63rd street, and the center line of South Wood street; thence west along said line 125 feet south of the south line of West 63rd street to the center line of South Western avenue; thence south along the center line of South Western avenue to the center line of West 69th street; thence east along the center line of West 69th street to the center line of South Wood street; thence north along the center line of South Wood street to the place of beginning.

Also beginning at the intersection of West 59th street and South Narragansett avenue; thence west along the center line of West 59th street to the center line of South Harlem avenue; thence south along the center line of South Harlem avenue to the center line of West 65th street; thence east along the center line of West 65th street to the center line of South Narragansett avenue; thence north along the center line of South Narragansett avenue to the place of beginning.

Also beginning at the intersection of the center line of East 89th street with the center line of Stony Island avenue; thence north along the center line of Stony Island avenue to its intersection with the center line of East 87th street; thence east along the center line of East 87th street to its intersection with the center line of Jeffery avenue; thence south along the center line of Jeffery avenue to its intersection with the center line of East 89th street; thence west along the center line of East 89th street to the place of beginning.

Also beginning at the intersection of West 106th street and South Halsted street; thence west along the center line of West 106th

McGraw-Hill
Building,
Chicago



Thielbar & Fugard,
Architects



Dilks Construction Company

160 North La Salle Street

Chicago

street to the center line of the alley first west of South Peoria street; thence north along the center line of said alley to the center line of West 103rd street; thence east along the center line of West 103rd street to its intersection with the center line of South Halsted street; thence south along the center line of South Halsted street to the place of beginning.

Also, all the territory lying between lines 125 feet on either side of and parallel to the following streets: East and West 103rd street between Indiana avenue and South Halsted street; East 107th street between Indiana avenue and South State street; and Wentworth avenue between West 99th street and West 119th street.

Note: The following paragraph is contained in an ordinance passed June 20, 1928:

"The territory adjoining both sides of Wentworth avenue between West 99th street and West 103rd street is hereby excluded from the fire-limit area of the City of Chicago."

Also beginning at the intersection of Peterson avenue and the North Shore Channel of the Sanitary District of Chicago; thence west along the center line of Peterson avenue to the center line of North Central Park avenue; thence south along the center line of North Central Park avenue to the center line of Bryn Mawr avenue; thence east along the center line of Bryn Mawr avenue to the center line of the North Shore Channel of the Sanitary District of Chicago; thence north along the center line of the North Shore Channel of the Sanitary District of Chicago to the place of beginning.

Also beginning at the intersection of West 103rd street and South Halsted street; thence west along the center line of West 103rd street to the center line of Vincennes avenue; thence southwesterly along the center line of Vincennes avenue to the center line of West 107th street; thence east along the center line of West 107th street to the center line of South Halsted street; thence north along the center line of South Halsted street to the place of beginning.

Also beginning at the intersection of West 107th street and South Halsted street; thence west along the center line of West 107 street to the present fire limit line just east of Vincennes avenue; thence generally in a southwesterly direction along the said present fire limit line lying along and just east of said Vincennes avenue to the center line of West 119th street; thence east along the center line of West 119th street to its intersection with the center line of South Halsted street; thence north along the center line of South Halsted street to the place of beginning.

Also beginning at the intersection of West 103rd street and Stewart avenue; thence south along the center line of Stewart avenue to the center line of West 111th street; thence west along the center line of West 111th street to the center line of South Halsted street; thence north along the center line of South Halsted street to the center line of West 103rd street; thence east along the center line of West 103rd street to the place of beginning.

Also beginning at the intersection of South Michigan avenue and East 119th street; thence south along the center line of South Michigan avenue to the center line of East 127th street.

Also beginning at the intersection of West 69th street and South California avenue; thence west along the center line of West 69th street to the center line of South Cicero avenue; thence south along the center line of South Cicero avenue to West 75th street; thence east along the center line of West 75th street to South California avenue; thence north along the center line of South California avenue to the place of beginning.

Beginning at the intersection of the center lines of South Halsted street and West 99th street, thence running east on the center line

of West 99th street to the right of way of the Chicago & Western Indiana Railroad, thence south on said right of way line to the center line of West 103rd street, thence west on the center line of West 103rd street to the center line of South Halsted street, thence north on the center line of South Halsted street to the place of beginning.

Passed Sept. 12, 1928.

Also beginning at the intersection of West 127th street and South Peoria street; thence west along the center line of West 127th street to the western city limits; thence south along the western city limits line to the north line of the Little Calumet River; thence east along the north line of the Little Calumet River to the center line of South Peoria street; thence north along the center line of South Peoria street to the place of beginning.

Passed Oct. 31, 1928.

Also all territory lying between the center lines of the following streets as boundaries; beginning at the intersection of the center line of East 99th street and the center line of Indiana avenue, thence south along the center line of Indiana avenue to the center line of Kensington avenue, thence east along the center line of Kensington avenue to the center line of Cottage Grove avenue, thence northeast along the center line of Cottage Grove avenue to the center line of East 99th street, thence west along the center line of East 99th street to the center line of Indiana avenue.

Passed Nov. 21, 1928.

Also the west side of Indiana avenue from East 99th street to East 103rd street.

Passed December 12, 1928.

Also beginning at the intersection of East 110th street and Avenue M; thence east along the center line of 110th street to the center line of Avenue G; thence north along the center line of Avenue G to the center line of East 108th street; thence east along the center line of East 108th street to the South Chicago and Southern Railway; thence north along the South Chicago and Southern Railway to the center line of East 106th street; thence west along the center line of East 106th street to the center line of Avenue M; thence south along the center line of Avenue M to the place of beginning.

Passed December 19, 1928.

Also beginning at the intersection of West 99th street and Princeton avenue; thence south along the east side of Princeton avenue to the center line of West 103rd street; thence west along the center line of West 103rd street to the right of way of the Chicago and Western Indiana Railroad tracks; thence north along the right of way of said railroad tracks to the center line of West 99th street; thence east along the center line of West 99th street to the place of beginning.

Passed March 18, 1929.

Also beginning at the intersection of West 95th street and South Halsted street; thence south along the center line of South Halsted street to the center line of West 99th street; thence east along the center line of West 99th street to the center line of Eggleston avenue; thence north along the center line of Eggleston avenue to the center line of West 95th street and thence west along the center line of West 95th street to the place of beginning.

Passed March 30, 1929.

Exclusion of certain territory from the fire-limit area.

Exclusion of certain territory from the fire-limit area.

The territory adjoining both sides of West 102nd street between Princeton avenue and the Chicago and Western Indiana Railroad is hereby excluded from the fire-limit area of the City of Chicago.

Passed April 22, 1929.



Americans Bankers Insurance Bldg., Cass & Ohio Sts., Chicago, Ill.

Child & Smith, Architects

E. P. Strandberg Company

INC.

CONTRACTORS AND BUILDERS

EST. 1886



Telephone Superior 0437

232 East Erie Street, CHICAGO

The territory adjoining both sides of South Peoria street between West 117th street and West 118 street and West 118th street is hereby excluded from the fire-limit area of the City of Chicago.

Passed June 14, 1929.

(c) Excepting the district bounded as follows: beginning at the intersection of a line 125 feet south of the south line of Foster avenue and the center line of north Leavitt street, thence west along said line 125 feet south of the south line of Foster avenue to a line 125 feet east of the east line of north Western avenue, thence south along said line 125 feet east of the east line of north Western avenue to a line 125 feet east of the east line of Lincoln avenue, thence southeasterly along said line 125 feet east of the east line of Lincoln avenue, thence southeasterly along said line 125 feet east of the east line of Lincoln avenue to a line 125 feet north of the north line of Lawrence avenue, thence east along said line 125 feet north of the north line of Lawrence avenue to the center line of north Leavitt street, thence north along the center line of north Leavitt street to the place of beginning.

(d) Excepting also the district bounded as follows: beginning at the intersection of a line 125 feet south of the south line of Belmont avenue and the center line of north Kedzie avenue, thence west along said line 125 feet south of the south line of Belmont avenue to the center line of north Crawford avenue, thence south along the center line of north Crawford avenue to the center line of north Fullerton avenue, thence east along the center line of Fullerton avenue to the center line of north Central Park avenue, thence north along the center line of north Central Park avenue to the center line of Diversey avenue, thence east along the center line of Diversey avenue to the center line of north Kedzie avenue, thence north along the center line of north Kedzie avenue to the place of beginning.

(e) Excepting also the district bounded as follows: beginning at the intersection of a line 125 feet south of the south line of west Division street and the center line of north Laramie avenue, thence west along said line 125 feet south of the south line of west Division street to the center line of north Central avenue, thence south along the center line of north Central avenue to the center line of west Chicago avenue, thence east along the center line of west Chicago avenue to the center line of north Laramie avenue, thence north along the center line of north Laramie avenue to the place of beginning.

(f) Excepting also the district bounded as follows: beginning at the intersection of the center line of west 43rd street and a line 125 feet west of south State street, thence west along the center line of west 43rd street to a line 125 feet east of the east line of Wentworth avenue, thence south along said line 125 feet east of the east line of Wentworth avenue to the center line of west Garfield boulevard, thence east along the center line of west Garfield boulevard to a line 125 feet west of the west line of south State street, thence north along said line 125 feet west of the west line of south State street to the place of beginning.

(g) Excepting also the district bounded as follows: beginning at the intersection of the center line of west 40th street and the center line of Normal avenue, thence west along the center line of west 40th street to the center line of Wallace street, thence south along the center line of Wallace street to the center line of west 43rd street, thence west along the center line of west 43rd street to a line 125 feet east of the east line of south Halsted street, thence south along said line 125 feet east of the east line of south Halsted street to the center line of west 51st street, thence east along the cen-

ter line of west 51st street to the center line of south Union avenue, thence south along the center line of south Union avenue to the center line of west Garfield boulevard, thence east along the center line of west Garfield boulevard to a line 125 feet west of the west line of Wentworth avenue, thence north along said line 125 feet west of the west line of Wentworth avenue to the center line of west 43rd street, thence west along the center line of west 43rd street to the center line of Normal avenue, thence north along the center line of Normal avenue to the place of beginning.

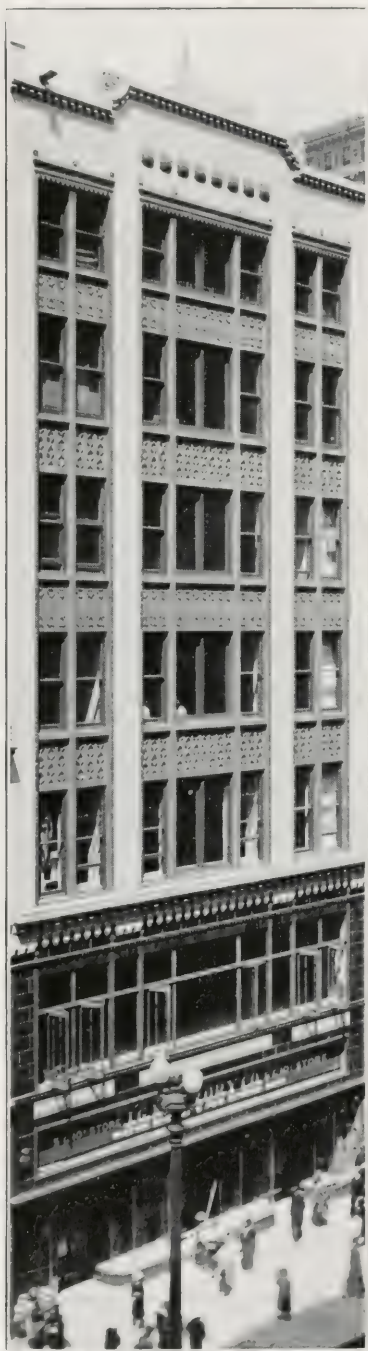
(h) Excepting also the district bounded as follows: beginning at the intersection of the center line of west 52nd street and the center line of south Peoria street, thence west along the center line of west 52nd street to the center line of south Morgan street, thence south along the center line of south Morgan street to the center line of west 53rd street, thence east along the center line of west 53rd street to the center line of south Peoria street, thence north along the center line of south Peoria street to the place of beginning.

(i) Excepting also the district bounded as follows: beginning at the intersection of a line 125 feet south of the south line of west 83rd street and the center line of south Winchester avenue, thence west along said line 125 feet south of the south line of west 83rd street to the east line of the right of way of the Pittsburgh, Chicago, Cincinnati and St. Louis Railway, thence southeasterly along the said east line of the right of way to the Pittsburgh, Chicago, Cincinnati and St. Louis Railway to the center line of west 87th street, thence east along the center line of west 87th street to the center line of Beverly avenue, thence southeasterly along the center line of Beverly avenue to the northwestern boundary line of the right of way of the Chicago, Rock Island and Pacific Railway Company in south Hermitage avenue, thence northeasterly in south Hermitage avenue along said northwestern boundary line of the right of way of the Chicago, Rock Island and Pacific Railway Company to the center line of south Winchester avenue, thence northwesterly and north along the center line of south Winchester avenue to the place of beginning.

(j) Excepting also the district bounded as follows: beginning at the intersection of the center line of west 91st street and a line 125 feet west of the west line of south Ashland avenue, thence west along the center line of west 91st street to the center line of Beverly avenue, thence southeasterly along the center line of Beverly avenue to a line 125 feet west of the west line of south Ashland avenue, thence north along said line 125 feet west of the west line of south Ashland avenue to the place of beginning.

(k) Excepting also the district bounded as follows: beginning at the intersection of a line 125 feet south of the south line of west 95th street and the center line of Vincennes avenue, thence west along said line 125 feet south of the south line of west 95th street to the center line of Beverly avenue, thence southeasterly along the center line of Beverly avenue to the center line of Vincennes avenue, thence northeasterly along the center line of Vincennes avenue to the place of beginning.

(l) Excepting also the following territory, which shall be known as a provisional fire limit district: beginning at the intersection of the shore of Lake Michigan and the center line of Rogers avenue, thence southwesterly along the center line of Rogers avenue to the east line of the right of way of the Chicago and North Western Railway Company, thence south along the east line of the right of way of the Chicago and North Western Railway Company to the



AVERY BRUNDAGE COMPANY



GENERAL CONTRACTOR



110 South Dearborn Street
CHICAGO

CENTRAL 5187

The McCrory Stores Corp.
33 S. State St., Chicago.
Luschenko & Esser, Architects.

center line of Devon avenue, thence east along the center line of Devon avenue to the shore of Lake Michigan, thence northwesterly along the shore of Lake Michigan to the place of beginning.

(m) Excepting also the following territory which shall be known as a provisional fire limit district: beginning at the intersection of the shore of Lake Michigan and the center line of east 67th street, thence west along the center line of east 67th street to the center line of Cottage Grove avenue, thence north along the center line of Cottage Grove avenue, thence north along the center line of Cottage Grove avenue to the center line of east 63rd street, thence west along the center line of East 63rd street to the center line of South Park avenue, thence south along the center line of South Park avenue to the center line of east Marquette road, thence west along the center line of east Marquette road to the northeasterly line of the right of way of the Lake Shore and Michigan Southern Railway Company, thence northwesterly along the northeasterly line of the right of way of the Lake Shore and Michigan Southern Railway Company to the center line of south State street, thence south along the center line of south State street to the center line of east 75th street, thence east along the center line of east 75th street to the center line of Cottage Grove avenue, thence south along the center line of Cottage Grove avenue to a line 125 feet south of the south line of east 79th street, thence east along said line 125 feet south of the south line of east 79th street to the east line of the right of way of the Illinois Central Railroad, thence north along the east line of the right of way of the Illinois Central Railroad to the center line of east 79th street, thence east along the center line of east 79th street to the center line of Stony Island avenue, thence south along the center line of Stony Island avenue to a line 125 feet south of the south line of east 79th street, thence east along said line 125 feet south of the south line of east 79th street to the shore of Lake Michigan, thence northwesterly along the shore of Lake Michigan to the place of beginning.

(n) Excepting also the following territory which shall be known as a provisional fire limit district: beginning at the intersection of the center line of east 87th street and a line 125 feet east of the east line of the right of way of the Illinois Central Railroad, thence west along the center line of east 87th street to a line 125 feet west of the west line of South Park avenue, thence south along said line 125 feet west of the west line of South Park avenue to the center line of east 95th street, thence east along the center line of east 95th street to a line 125 feet east of the east line of the right of way of the Illinois Central Railroad Company, thence northeasterly along said line 125 feet east of the east line of the right of way of the Illinois Central Railroad Company to the place of beginning.

Excepting also the following territory which shall be known as a provisional fire limit district: beginning at the intersection of a line 125 feet south of the south line of West 95th street and the center line of Vincennes avenue, thence west along said line 125 feet south of the south line of West 95th street to the center line of Beverly avenue, thence in a southeasterly direction along the center line of Beverly avenue to the center line of West 99th street, thence east along the center line of West 99th street, to the center line of Vincennes avenue, thence in a northeasterly direction along the center line of Vincennes avenue to the place of beginning.

The territory bounded on the south by the north side of West 95th street; on the north by the south side of West 90th street; on the east by the west side of South State

street; and on the west by the east side of Wentworth avenue, shall be and the same is hereby excluded from the fire limits of the City of Chicago; provided, however, that it shall be unlawful to erect within said territory any buildings costing less than twenty-one hundred (\$2,100.00) dollars, except garages on the rear of the lots of said territory.

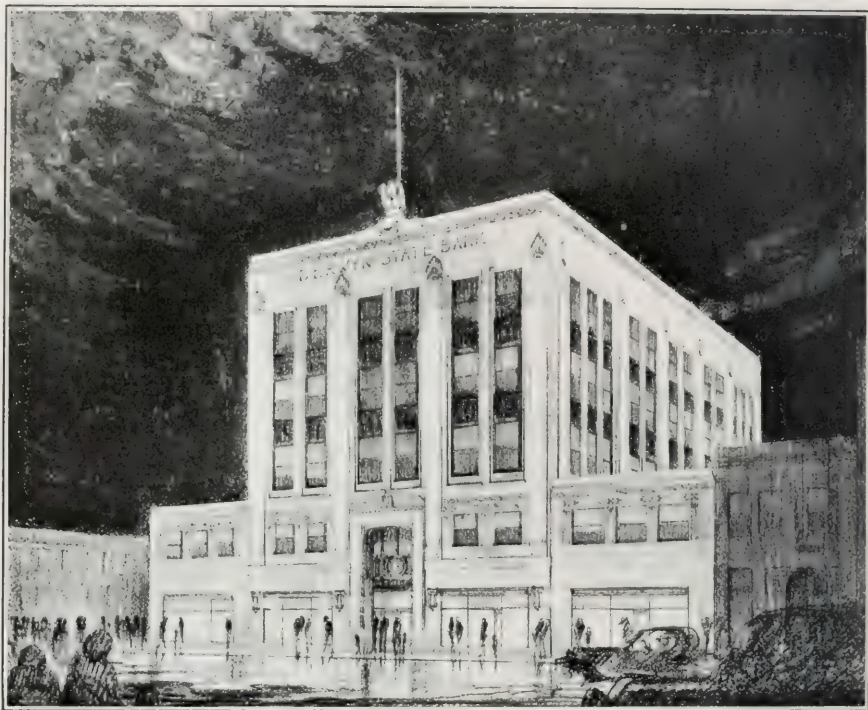
(o) Within the provisional fire limits above described it shall be lawful to erect a frame or wooden building to be used for residence or mercantile purposes upon presenting a petition to the commissioner of buildings, together with a plat, plans and specifications showing the space where such building is to be erected. Such petition shall be verified by the affidavit of the applicant and shall contain the written consent of the owners of a majority of the frontage upon both sides of the streets surrounding the square in which the proposed building is to be erected.

(p) No frame or wooden residence or mercantile building shall be erected within the provisional fire limits exceeding 40 feet in height.

935. Maps showing fire limits.) As soon as practicable after the passage of this ordinance the superintendent of maps shall prepare, or cause to be prepared, three maps of the city of Chicago drawn to a scale sufficiently large to meet the requirements of this section, on which shall be accurately indicated the area and boundaries of the fire limits and of the provisional fire limits, as defined in the preceding section. Such maps shall be alike in all respects. One of said maps, when found to be accurate and in strict compliance with the foregoing section with respect to areas and boundaries, to the satisfaction of the mayor, shall be marked as approved by the mayor, and shall be placed in the custody of the city clerk, and the same shall be kept on file in the office of said clerk and regarded as an exhibit the same as if were a part of this ordinance. Another of said maps shall be turned over to the commissioner of buildings, whose duty it shall be to preserve the same, and to supervise the correction of all three of said maps from time to time as hereinafter provided. The third of said maps shall be retained by the superintendent of maps. Such maps may be altered, corrected, revised or replaced from time to time as the city council may direct.

After the passage of this ordinance the city council, in future ordinances making changes in the fire limits or provisional fire limits of the city, may make reference to the said map on file in the city clerk's office, and may alter, correct or revise the fire limits or the provisional fire limits of the city by reference thereto or by stating what change shall be made to the fire limits or provisional fire limits as shown on said map; such references to said map, when clear and unambiguous, shall be deemed authoritative and shall be regarded as describing the areas and boundaries of the changed portion of the said fire limits or provisional fire limits regardless of whether the language of such ordinance correctly amends the preceding section or not; and such alterations, corrections and revisions, when duly passed, approved and published, shall be deemed amendments of the preceding section and shall be construed as altering, correcting and revising the fire limits as set forth in the preceding section.

It shall be the duty of the superintendent of maps to correct the said maps under the supervision of the commissioner of buildings so as to accurately portray the fire limits and provisional fire limits up to date whenever a change is authorized therein as by this section provided, and to replace the said maps with new maps when the city council so directs.



Berwyn State Bank

Emil Liska, Architect

Algot B. Larson Co.

BUILDERS

3833-37 W. Lake Street

CHICAGO

Telephone Nevada 2856-2857

ARTICLE XXVI.

Regulations Concerning Places of Amusement.

936. **No amusement license to issue without certificate from city officials.)** No license shall be issued to any person, firm or corporation to produce, present, conduct, operate or offer for gain or profit, any theatricals, shows or amusements until the commissioner of buildings, the commissioner of health, the chief fire prevention Engineer and the commissioner of gas and electricity shall have certified in writing that the room or place where it is proposed to produce, present, conduct, operate or offer such theatricals, shows or amusements complies in every respect with the ordinances of the city of Chicago relating to their respective departments.

937. **Lighting—building kept lighted during performance.)** Every portion of any building or structure in which theatricals, shows and amusements are offered, operated, presented or exhibited for gain or profit, devoted to the use or accommodation of the public, and all outlets therefrom leading to the street, including all open courts, corridors, stairways, exits and emergency exit stairways, shall be well and properly lighted during every performance, and shall remain lighted until the entire audience has left the premises. It shall be the duty of the chief fire prevention Engineer to enforce the provisions of this section.

938. **Independent lighting system for exits.)** All stairways and corridors in every building or structure in which theatricals, shows and amusements are offered, operated, presented or exhibited for gain shall be supplied with a supplemental lighting system of electricity, gas or sperm oil, and such system shall be independent of all other lights in such building or structure and shall be in operation during the entire period that such building or structure is open to the public and until the entire audience has left the building.

The word "EXIT" shall appear in letters at least six inches high over the opening of every means of egress from such building or structure, and a red light shall be kept burning over such sign.

It shall be the duty of the commissioner of gas and electricity to enforce the provisions of this section relative to the installation of the lighting provisions contained therein; and it shall be the duty of the chief of fire prevention and public safety to see that the lights are kept lighted as required by this section.

939. **Gas calcium lights prohibited—arc lights.)** The use of gas calcium lights in any building in which theatricals, shows and amusements are offered, operated, presented or exhibited for gain is hereby prohibited.

All arc lights used on the stage shall be subject to the approval of the commissioner of gas and electricity.

940. **Exit doors or gates not to be locked—obstructions prohibited.)** No exit door or gate in any place in which theatricals, shows and amusements are offered, operated, presented or exhibited for gain shall be locked or fastened in any manner during the entire time that such place of amusement is open to the public.

All aisles, passageways, corridors and exits of all such places of amusement shall be kept free from camp stools, chairs, sofas, draperies and other obstructions, and no person shall be allowed to stand in or occupy any of such aisles, passageways, corridors or exits during any performance.

941. **Diagram of exits and seats.)** It shall be the duty of the owner, lessee or manager of any theater having a seating capacity in excess of three hundred persons to cause to be printed on all programs fur-

nished for any performance, on the page opposite to that upon which the cast is printed, a diagram showing conspicuously the place of every exit from such building. A diagram of the floor plan, showing the location of every seat on each floor, and also the exits leading from each floor, drawn to a scale of one-eighth of an inch to the foot, shall be posted in a conspicuous place at or near the box office of any such theater, so as to be easily seen by the public. It shall be the duty of the chief fire prevention Engineer to enforce the provisions of this section.

942. **Penalty.)** Any person, firm or corporation violating any of the provisions of this article shall be fined not more than two hundred dollars for each offense, and each and every day upon which any such person, firm or corporation shall give, conduct, produce, present, offer or operate any such entertainment contrary to or in violation of any of the provisions of this article shall constitute a separate and distinct offense.

ARTICLE XXVII.

NUISANCE AND PENALTY.

943. **Nuisance.)** (a) Every building or structure constructed or maintained in violation of this chapter, or which is in an unsanitary condition, or in an unsafe or dangerous condition or which in any manner endangers the health or safety of any person or persons, is hereby declared to be a public nuisance.

(b) Every building or part thereof which is in an unsanitary condition by reason of the basement or cellar being damp or wet, or by reason of the floor of such basement or cellar being covered with stagnant water, or by reason of the presence of sewer gas, or by reason of any portion of a building being infected with disease or being unfit for human habitation, or which, by reason of any other unsanitary condition, is a source of sickness, or which endangers the public health, is hereby declared to be a public nuisance.

944. **Theatres Located Above the First Floor Declared a Nuisance—Exceptions—Regulations.)** It shall be and it is hereby declared to be a nuisance to conduct a public theatre in a room located on any floor above the first floor level of a building of other than fireproof construction or a building which did not comply with the ordinances of the City of Chicago with reference to fireproof construction in force at the time such building was built. All such public theatres now being conducted in rooms on any floor above the first floor level of a building of other than fireproof construction or a building which did not comply with the ordinances of the City of Chicago with reference to fireproof construction in force at the time such building was built, with a seating capacity of more than three hundred, shall be and they are hereby declared to be nuisances; and it shall be unlawful to continue to use such rooms for public theatrical purposes whether the same are equipped with a stage and scenery or are used for moving picture shows only.

The provisions of the foregoing paragraph shall not apply where the theatre is altered so as to bring the main audience room on the first floor level and slow-burning construction is used in the reconstruction work and in making such alterations and all requirements of the ordinances of the City applying to Class IVb are complied with. nor shall said provisions apply where the following conditions are fully complied with:

(a) The building shall be used for theatre purposes only.

(b) The seating capacity shall not exceed the seating capacity existing therein on July 22 1912.



Borden's Farm Products Co., Forest Park Branch 116'x265'

E. E. Roberts & Elmer C. Roberts, Architects

McKeown Bros. Company, Contractors



A section of our plant, Chicago, showing timber trusses during process of fabrication.

McKeown Bros. Company

Established 1894

General Contractors for Buildings
and Builders of all types of Wood Roof Trusses

Telephone Central 7950

112 W. Adams Street, CHICAGO

(c) Metal scenery only shall be used; provided, however, one proscenium drop, one back drop and three borders may be used provided they are of asbestos cloth subject to the approval of the Chief Fire Prevention Engineer.

(d) All seats shall be at least eighteen inches wide and spaced thirty-two inches from back to back.

(e) There shall be no boxes, stalls or loges.

(f) No stove or furnace heating shall be allowed.

(g) All lighting shall be by electricity; provided, however, that gas may be used in connection with exit lights.

(h) At least sixty inches of exit space shall be provided for every one hundred seats.

(i) The stage shall not be more than twenty-two feet from front to rear.

(j) The audience room shall be surrounded by brick walls.

(k) In all cases where dressing rooms are placed back of the stage the brick wall shall extend between the stage and such dressing rooms, but the stage wall may contain a door leading to such dressing room located behind said wall.

(l) All dressing rooms shall have incombustible partitions and all existing wooden partitions, wherever located, shall be removed.

(m) There shall be an open space on at least three sides of the building containing such theatre, except as otherwise herein provided, which space shall be open from the floor level of the auditorium to the sky.

(n) One of such open spaces must be a public street and the others public or private alleys or open spaces leading directly to a street or public or private alley, and in all cases where such open space is private ground, it must be at least five feet wide where the seating capacity does not exceed six hundred, and six inches additional width must be provided for each one hundred seats installed in such theatre in excess of six hundred; provided, however, that in all cases where a sprinkler system is installed over the stage, together with an approved power pump and pressure tank subject to the approval of the Chief Fire Prevention Engineer, it shall be sufficient if there are open spaces as above required on two sides of the building in which such theatre is located.

(o) Wherever the side of an audience room adjoins an open space, as hereinabove required, which open space is on private ground or is a private or public alley, there shall be a five-foot open iron platform extending the entire length of the audience room, with an open iron stairway leading to the ground from said platform at each end thereof, and in all such cases there shall be a stairway fire escape leading from the gallery of the

theatre, if there is a gallery, to such platform.

(p) Where the only open space adjoining the side of the audience room is a public street, there shall be a five-foot stairway, enclosed by walls of incombustible material, leading from the middle of the audience room on the side contiguous to such street to the first floor, at the bottom of which stairway there shall be an exit opening directly to the street, and in such cases there shall be a three-foot stairway leading from the gallery, if there is a gallery, to the main floor of the auditorium, the bottom of which shall be within ten feet of the stairway leading from such main floor to the ground floor.

(q) There shall be an exit at least five feet wide on each side of the stage, which exit shall lead through a passageway constructed entirely of incombustible material to a stairway which shall be completely enclosed with incombustible material. Said stairway shall lead to the ground level and communicate through a passageway of incombustible material directly with a public street or alley or a private alley which leads directly to a public street or alley.

(r) An exit shall be provided on each side of the balcony or gallery at the end nearest the stage by means of a stairway of incombustible material leading to the main floor of the audience room.

(s) The exits at the front of the theatre shall communicate with stairways of incombustible material leading directly to the ground level and either opening directly out upon the street or communicating with the street through fireproof passageways, and in no case shall any stairway leading from the main audience floor to the ground level communicate or connect with any other such stairway.

(t) All doors leading through the proscenium wall or from the stage to the dressing rooms shall be of incombustible material.

(u) All alterations made in buildings containing such theatres shall be of slow-burning construction, except as herein otherwise provided.

945. Penalty. Any person, firm or corporation that violates, neglects or refuses to comply with, or who resists or opposes the enforcement of any of the provisions of this chapter, where no other penalty is provided, shall be fined not less than twenty-five dollars nor more than two hundred dollars for each offense and every such person, firm or corporation shall be deemed guilty of a separate offense for every day on which such violation, neglect or refusal shall continue; and any builder or contractor who shall construct any building in violation of any of the provisions of this chapter, and any architect designing, drawing plans for, or having charge of such building, or who who shall permit it to be constructed, shall be liable to the penalties provided and imposed by this section.

HOUSING OF MOTOR VEHICLES IN FIREPROOF APARTMENT HOTELS AND APARTMENT BUILDINGS

Permission for the Use of Space for the Community Housing of Motor Vehicles belonging to Occupants of Fireproof Apartment Hotels and Apartment Buildings.

Be it ordained by the City Council of the City of Chicago:

Section 1. That apartment hotels and apartment buildings erected of fireproof construction may have in connection therewith either in a separate structure upon the same lot, or within the same structure, a space

set apart for the community use of the occupants only of such apartment hotel or apartment building for the housing of self-propelled or motor-driven vehicles, provided the portion so used does not exceed in volume fifteen per cent (15%) of the total volume of structures upon the same lot, and provided that the portion so used complies with all of the requirements of this Chapter, the Sanitary Department, the Fire Prevention Bureau, and the Zoning Ordinance of the City of Chicago, and provided further that the portion so used when contained within the



Klee Bros. Building, Milwaukee and Cicero Aves., Chicago, Ill.

A. Epstein, Structural Engineer

S. N. NIELSEN COMPANY

INCORPORATED

BUILDING CONSTRUCTION
Masonry and Reinforced Concrete

OFFICE:

**3059 AUGUSTA STREET
CHICAGO**

TELEPHONE NEVADA 6020

ESTABLISHED 1893

same structure shall be separated from habitable portions of such structure by walls of brick not less than 12 inches in thickness, or of hard-burned clay tile not less than 10 inches in thickness and plastered on both sides with cement plaster 1 inch in thickness, or of concrete not less than 10 inches in thickness, and by floors of concrete or clay tile, or concrete and clay tile in combination not less than 12 inches in thickness.

Should that portion of such structure so used not exceed in volume seven per cent (7%) of the total volume of structures upon the same lot, then no frontage consents shall be required.

This ordinance shall not be construed as repealing or modifying any valid ordinances

of the City of Chicago now in effect which restrict location of industries, entertainments, occupations, establishments or enterprises of any kind either by requiring frontage consents from property-owners or residents affected by such location, or by prohibiting or restricting the location of same within a fixed distance from a hospital, church, public school, or parochial school, or the grounds thereof, or on or near any class of streets or boulevards or any parks, playgrounds, or bathing beaches. As to all other ordinances or parts of ordinances in conflict with any of the provisions of this ordinance, the same are hereby repealed.

Section 2. This ordinance shall be in force and effect from and after its passage and approval.

REGULATIONS GOVERNING INSTALLATION OF WARM AIR HEATING PLANTS

Passed, December 28, 1927, as subsequently amended.

Be it ordained by the City Council of the City of Chicago:

Section 1. **Definition.** A gravity warm air heating plant shall consist of one or more warm air furnaces, enclosed within casings, together with necessary appurtenances thereto, consisting of warm air pipes and fittings, cold air or recirculating pipes, ducts, boxes and fittings, smoke pipes and fittings, registers, borders, faces and grilles, the same intended for the heating of buildings, in which they may be installed.

Section 2. **Minimum Requirements.** The provisions of this ordinance shall be held to be the minimum requirements adopted for the protection of health, welfare, sanitation and the safety of the community and for the protection of the ultimate purchaser or user of the heating plant.

Section 3. **Provisions in new buildings and in buildings already constructed.** The following provision shall be complied with in any building wherein a warm air heating plant is or is to be installed:

A. Buildings Under Construction.

The term "new buildings" as used in this ordinance, shall be construed to mean buildings which have not been and are not inhabited.

(1) Where warm air register boxes, heads, pipes or stacks are to be installed, joists shall be set not less than sixteen inches (16") on centers and shall be butted and not lapped. Studding shall be set directly over and under joists, leaving a space of not less than fourteen inches (14") between studs and joints. Wherever joists are cut, headers must be put in to support joists, in all buildings having studded exterior walls, the floors shall be extended to the outside sheathing and all spaces between studding shall be closed at the attic floor line.

(2) All partition walls (or sections of these walls) in which heat stacks to second or third floor rooms are to be installed, shall be of sufficient size to accommodate stacks required to heat said rooms.

(3) In new construction, it shall be unlawful for anyone to do any cutting of woodwork for the reception of the wall stacks or baseboard registers except the general contractor or the contractor in charge of the work for him, or some duly qualified carpenter working under him. Where it is necessary to cut joists or supporting members, headers shall be put in and braced so as not to weaken the structure.

B. Building Already Constructed.

The term "buildings already constructed", as used in this ordinance, shall be construed to mean completed buildings which have been or are inhabited.

(1) It shall not be necessary to remove the plaster and lath from the walls where

the new stacks are to be run, provided that stacks have proper capacity for connecting basement pipe and can be securely fastened together and shoved in either from above or below.

(2) On buildings already constructed, it shall be lawful for the heating contractor to do any cutting necessary for the reception of all appurtenances in the installation of a gravity warm air heating plant.

(3) Otherwise, installation of new work in buildings already constructed shall, in general, conform to the provisions of this ordinance.

Rule A.

Each First Floor Room.

Divide square feet of glass by 12,

Divide square feet of net outside wall by

60,

(See Table A)

Divide cubic contents by 800,

Add together the above and multiply by 9,

The result is the area of the basement pipe.

The sum of:

Glass (sq. ft.) (Par. 5C) \div 12 }

Net Wall (sq. ft.) (Par. 6C) \div 60 } \times 9 =

Cubic Contents \div 800 } Area of basement pipe.

Rule B.

Each Second Floor Room.

Divide square feet of glass by 12,

Divide square feet of net outside wall by

60,

(See Table A)

Divide cubic contents by 800,

Add together the above and multiply by 6,

The result is the area of the basement pipe.

The sum of:

Glass (sq. ft.) (Par. 5C) \div 12 }

Net Wall (sq. ft.) (Par. 6C) \div 60 } \times 6 =

Cubic Contents \div 800 } Area of basement pipe.

Rule C.

Each Third Floor Room.

Divide square feet of glass by 12,

Divide square feet of net outside wall by

60,

(See Table A)

Divide cubic contents by 800,

Add together the above and multiply by 5,

The result is the area of the basement pipe.

The sum of:

Glass (sq. ft.) (Par. 5C) \div 12 }

Net Wall (sq. ft.) (Par. 6C) \div 60 } \times 5 =

Cubic Contents \div 800 } Area of basement pipe.

B. Basis of working rules for pipes.

These formulae are for 70 degrees temperature difference (outside temperature zero, inside temperature 70 degrees Fahrenheit). When temperature difference is more than 70 degrees, add 1½ per cent per degree to final figures. When temperature difference is less than 70 degrees, deduct 1½ per cent per degree from final figures.

MAAS-MANSON COMPANY
BUILDING CONTRACTORS

241 EAST OHIO STREET

Phone Superior 6898

CHICAGO

The values as given in Table A for use in the working rules, Section 4, Rules A, B and C are derived as follows:—

Example.

The factor 60 in Table A, Item No. 1, is based upon a co-efficient of heat transmission of 0.23 B. t. u. per square foot per degree difference per hour, thus:

$W \times 0.23 \times 70 = 111 = \text{sq. in. first floor leader to compensate for the heat loss through walls only. In this, } W = \text{net area of exposed wall in sq. ft.; } 0.23 = \text{co-efficient of transmission in B. t. u. per sq. ft. per degree difference per hr.; } 70 = \text{difference in temperature of air on inside and outside of wall; } 111 = \text{heat delivering capacity of 1 sq. in. of first floor leader pipe for a register temperature of } 175^{\circ} \text{ F. Reduced to its simplest approximate form this is } W \times 9$

60
Likewise substitute 167 for second floor and 200 for third floor in place of 111.

The values in Table A for the different types of walls were obtained by substitution of proper co-efficient of heat transmission instead of 0.23 in the above formula.

Table A.

The factor 60 used in Section 4, Rules A, B and C, is for buildings constructed as hereinafter set forth in Item No. 1. When other types of walls are used substitute the appropriate factor as follows:

No. 1	Frame wall constructed of siding, paper sheathing, studding, lath and plaster	60
No. 2	Frame wall constructed of siding or stucco direct to sheathing (no paper), lath and plaster.....	52
No. 3	9" Brick Wall (no plaster).....	40
No. 4	9" Brick Wall plastered one side.	48
No. 5	9" Brick Wall, air space, furred and plastered	65
No. 6	13" Brick Wall, no plaster.....	53
No. 7	13" Brick Wall plastered one side.	57
No. 8	13" Brick Wall, air space, furred and plastered	75
No. 9	4" Brick, 4" hollow tile, plastered	55
No. 10	4" Brick, paper, sheathing, studding, lath and plaster (brick veneer)	68
No. 11	8" Hollow tile, stucco and plaster	67
No. 12	8" Hollow tile, stucco, furred and plastered	90

Roofs.

No. 13	1" T. & G. Sheeting, tar and gravel	48
No. 14	1" T. & G. Sheeting and Composition roof	40
No. 15	1" T. & G. Sheeting and Tin.....	24
No. 16	Corrugated Iron on strips.....	9.3

Ceilings.

No. 17	Lath and plaster without floor above	50
No. 18	Lath and plaster with tight floor above	90
No. 19	Metal without floor above.....	40
No. 20	Metal with tight floor above.....	70

C. Method for Determining Size of Wall Stacks.

1. First Floor Rooms.
Same as Rule A.
2. Second Floor Rooms.
Not less than 70% of basement pipe area as determined in Rule C.
3. Third Floor Rooms.
Not less than 70% of basement pipe area as determined in Rule C.

4. Where one stack is used to convey heat to two rooms its net area shall be determined by adding together the areas of the two single stacks, which would be required to take care of the heat losses for each room were single stacks used.

5. In obtaining glass surface use full casement opening. An outside door is figured as glass.

6. To obtain net outside wall multiply height by width and deduct the glass in all windows and outside doors. For all rooms with attic spaces immediately above full ceiling areas shall be taken into account, using Table A.

7. For rooms having unusual exposure, ordinarily north, northeast and northwest, add 15% to pipe area. For east and west exposure add 10%.

8. Use no warm air pipe less than 8 inches in diameter. If a basement warm air pipe figures greater area than any standard commercial size then the nearest commercial size shall be used, provided however, that the total pipe area shall in no case be less than the total requirements according to Rules A, B and C.

9. It is understood in using the above values for determining basement warm air pipe areas, that these pipes should be run comparatively straight and that they should not be over 10 to 12 feet in length. Sharp turns and long pipes should have extra capacity.

10. The value of 800 (used in cubic contents) is for an estimated air change of one room volume per hour. If it is desired to provide for 1½ room volume use the figure 600. If for two rooms volume use the figure 400.

D. Transition Fittings and Stacks.

1. Transition from warm air pipes to stacks shall be made with a well designed elbow or boot and no stack shall be less than 70% of the area of the warm air pipe leading to it.

2. All first floor fittings and connections shall maintain a free area equal to the round basement pipes leading to them.

E. Method for Determining Size of Registers.

1. All registers shall have a free area at least equal to the area of the basement pipes leading to them.

F. Method for Determining Size of Furnace.

1. Add together the areas (expressed in square inches) necessary for heating the building, as determined by the foregoing **calculated** requirements, Section 4, Rules A, B and C, and install a furnace, rated by the following formula:

Furnace Rating Formula.

$L = 1.75 G (1 \text{ plus } 0.02 (R - 20))$

L=—square inches of warm air pipe connected to the furnace as calculated.

G=—grate area in square inches; the area of the fire pot at the grate level; its most restricted area.

R=—ratio of heating surface area to grate area; 1.75—a constant based upon the results obtained on a furnace having 20 square feet of heating surface for each square foot of grate, and including factors for:

E=—efficiency of heater;

C=—combustion rate;

F=—calorific value of fuel;

0.75=percentage of heat available at registers.

136=B. t. u. delivering value of one square inch of pipe, assuming half of the heat is sent to each floor. This value is based on an operating temperature of 175° F. at the register.



Chicago Town & Tennis Club Building, Ridge and Thome Aves., Chicago, Ill.
Philip B. Maher, Architect

Krahl Construction Company

General Contractors

SUPERior 3087

350 NORTH CLARK STREET

CHICAGO

The formula allows 1.75 square inches of warm air pipe area for each square inch of grate area, for the furnace having a ratio of heating surface to grate surface of 20 to 1. For furnaces having other ratios of heating surfaces to grate surface, it adds 2% or deducts 2% for each unit above or below a ratio of 20.

Application.

	No. 1 Positive Correction	No. 2 No. Correction	No. 3 Negative Correction
Grate area, sq. in. =	316	316	316
Heating surface area sq. in. =	7540	6920	5665
Ratio heating surface area to grate area =	21.8 to 1	20.0 to 1	16.4 to 1
R-20 =	1.8	0.0	-3.6
Correction per cent =	3.6	0.0	-7.2
1.75 G =	606	606	606
Plus 1.75 G Correction =	628	606	562

2. In second floor duplex, flats or apartments where separate heating plants are used, add 50% to the total net calculated areas as determined in Section 4, C 2. This represents the required warm air pipe capacity in square inches of the furnace for the second floor.

Section 5. Installation).

A. Location of Furnace.

The location of the furnace shall equalize the length of warm air runs as far as possible, yet give necessary preference to pipes supplying living rooms, dining rooms and main halls.

B. Foundation.

Furnace foundation of brick, cement, or other incombustible material must be provided. Said foundation to extend at least fifteen inches (15") at rear and sides of furnace casing and at least thirty-six inches (36") in front of furnace casing. Foundation to be level. Where a furnace is to be placed on combustible material, the specifications of the National Board of Fire Underwriters shall be complied with.

C. Setting or Assembling of Furnace.

(1) The base ring of the furnace shall be cemented to the foundation, making an air tight joint. The furnace parts shall be assembled plumb and level, and in a workman-like manner.

(2) All sections and joints shall be properly fitted. Joints requiring cement shall be well filled and all bolts shall be drawn up tightly.

(3) Every warm air furnace shall be equipped with a water pan or humidifying device to evaporate moisture in the air.

D. Casings.

(1) Warm air furnaces shall be enclosed in metal casings or walls of brick, tile or concrete.

(2) Portable. Sheet metal casings, including casing tops, shall be made of galvanized sheets, not lighter than 26-U. S. Standard Gauge. They shall fit the casings and casing rings closely, so as to be dust tight, and shall be securely fastened to the front. The casing shall be lined from the upper casing ring down to a line on a level with the grate.

(3) When side collars are used the casing top must be of sufficient height so that the largest warm air pipe can be taken from side without ovaling. In no case shall a distance less than eight inches (8") be maintained between the top of any furnace and the top line of the bonnet.

(4) Any furnace, the casing top of which shall come within twelve inches (12") of a combustible floor, ceiling or joist, shall be protected by a metal shield, extending not less than eighteen inches (18") beyond the casing of said furnace. This shield shall be suspended at least two inches below wood work, allowing free air space between shield and woodwork. No furnace casing or top, coming nearer than six inches (6") of ceiling or joists shall be allowed in any case.

(5) Openings for side casing collars shall be cut into the casing top, so that the tops of all openings are on a level. Casing collars shall be fitted into place with a proper flange, or bead on the outside and drawn up on the inside, making a dust tight joint. All collars shall be of same size as the warm air pipes to which they are to be connected.

(6) Brick, cement or hollow tile casing shall be constructed as follows: Walls shall be not less than eight inches (8") in thickness, and shall be constructed air tight. The least inside dimension of rectangular casing shall be the same as that of the portable casing of a corresponding size of furnace. Walls shall be carried to the same height as the portable walls, allowing not less than eight inches (8") between the top of the furnace and the bottom of the top cover. After placing the collars for the warm air pipes, continue the masonry up 2" above the top of the collars, lay single or tee irons across the furnace top, spaced 8", cover these with sheet metal not less than 26 U. S. Gauge, cover the sheet metal with masonry or sand and run the side walls four inches (4") above the roof of the furnace. A galvanized iron casing bonnet may be used on a brick set furnace.

Provisions shall be made in the walls for a manhole to give egress to heater.

E. Warm Air Pipes in Basement.

(1) All warm air pipes shall be made of bright tin not lighter than IC, or galvanized iron. All elbows shall be made of bright tin not lighter than IC, or galvanized iron, and shall be four piece, 90 degree. Side seams shall be locked seams. All joints shall be either double seamed or lapped not less than one and one-quarter inches (1 1/4") and such joints shall be match-beaded, or beaded and soldered, or riveted. All pipes and fittings shall be properly secured to ceiling or joist. No solder or riveted joint is required where round pipe slips over the casing collar or enters boot or box. Any pipe fourteen inches (14") or greater in diameter shall not be made of material lighter than IX tin or No. 26 U. S. Standard Gauge galvanized iron.

Note—It is recommended that all warm air pipes in the basement shall have an upward pitch of not less than one inch (1") per running foot.

(2) All warm air pipes in the basement shall be provided with dampers supported on both sides not more than two feet from the casing.

(3) Where warm air pipes pass through a masonry wall, a metal thimble shall be provided, having a diameter at least 1" greater than the pipe, and the pipe supported in such a manner that the air space is uniform on all sides.

(4) All openings, around first floor, wall and floor boxes and stacks to upper floors shall be sealed dust-tight.

F. Wall Stacks.

(1) All wall stacks or wall pipes, heads, boots, ells, tees, angles and other connections shall be made of bright tin or galvanized iron and shall be covered with not less than one thickness of 12-pound per one hundred square foot of asbestos paper. All such pipes shall be braced in a proper manner so as not to obstruct the flow of air but to retain the full capacity throughout. All joints shall be fastened securely and the stacks held in place by means of lugs, or straps.



Co-Operative Apartment Bldg., 1530 N. State Parkway, Chicago, Ill.
Granger & Bollenbacher, Architects

RALPH SOLLITT & SONS CONSTRUCTION CO.

GENERAL CONTRACTORS and BUILDERS

228 North La Salle Street

CHICAGO

Telephone Franklin 5409

518 East Sample Street, South Bend, Indiana

(2) All warm air stacks shall be run in inside walls. Where it is absolutely necessary to run same in outside walls, they shall be insulated with mineral wool or not less than three (3) thicknesses of air cell asbestos paper.

G. Registers.

(1) When baseboard or wall registers are used, they shall be attached to the stack head in such a manner that will prevent any leakage of air between the head and the register.

(2) Any furnace system having not more than two warm air registers, at least one of the registers shall be without valve or louvers and the pipe thereto shall be without damper.

H. Air Supply to Furnace.

(1) The air supply to furnace for warm air heating plants may be taken from outside or from within the building, or may be taken partially from outside and partially from within. In no case, however, shall air be supplied to any furnace from any basement or furnace room.

(2) The cold air intake or return where air is taken from within the building shall have a net area throughout its entire length of not less than the combined net area of all warm pipes leading from the furnace. This may be maintained in one or more ducts. No reverse incline or air trap will be allowed in any section thereof.

(3) When the cold air supply is taken wholly from the outside of the building the supply duct at its most contracted area must equal or exceed eighty per cent (80%) of the combined area of all warm air pipes leading from the furnace.

(4) Cold air ducts shall maintain a constant net area throughout their entire length and shall be made dust tight. Horizontal return ducts shall have at least 10% greater area than vertical connecting pipes. Where a boot or shoe is connected to the casing at the base, the opening shall not extend higher than a line on the level of the grate of the furnace. The width of the shoe shall be of proper measurement to make the area at least equal to that of the round or square pipe to which it is connected.

(5) Wherever the space between joists is used to convey cold air over head, such space shall be at least 10% greater than the area of the connecting pipe, and shall be sealed and air tight.

(6) When it is necessary to set the furnace over a pit and connect up cold air under the basement floor, such pit or cold air trench shall not exceed eighteen inches (18") in depth below the casing ring and the width of the trench or trenches shall be of proper measurement to make the area at least equal to the pipe to which it is connected. The connection between the cold air pipe or duct and the underground pit shall be made with converse transition joint.

(7) The cold air face or faces shall be made of wood or metal. When set in floors the top of wood faces shall be flush with floor. Where cold air face is placed in a seat or side wall the open work of face must extend to within at least one-quarter inch ($\frac{1}{4}$ ") of the floor line.

(8) The free area of cold air faces shall be at least equal to the free area of the duct or ducts to which they are connected.

(9) The capacity of any vertical cold air face shall be determined by multiplying the base line in inches by not to exceed fourteen inches (14") in height and deducting for the grills or cross bars.

I. Smoke Pipes.

(1) The smoke pipe shall be as short and direct as consistent with the location of the furnace. It shall be made of metal not lighter than No. 24 U. S. Standard Gauge and

not less than the full size of the collar on the furnace throughout its entire length. It must have no opening for attaching any fire place, stove, range, water heater, gas or ventilating connection. It shall be lock seamed or riveted; all joints shall lap not less than one and one-half inches ($1\frac{1}{2}$ ") and it shall be rigidly secured. Cast iron smoke pipe may be used.

(2) All smoke pipes shall be provided with check dampers, placed on the side of the pipe or at the end of a tee; when cast iron smoke pipe dampers are used they must be placed between the check damper and the furnace and supported on both sides of the pipe.

(3) Where the smoke pipe enters the flue, a thimble shall be cemented into the flue and the connections thereto made air tight. Should any smoke pipe come within eighteen inches (18") of any combustible material, such combustible material must be covered with asbestos paper and a metal shield so fastened that a two inch air space exists between this shield and the combustible material. This shield shall be no less in size than twice the diameter of the smoke pipe and of sufficient length to cover the combustible material at all points.

(4) No smoke pipe shall project through any external wall or window.

J. Pipeless or One Pipe Furnaces.

(1) When but one duplex grating is used for both warm air and cold air, in a so-called pipeless furnace, the area of the cold air intake shall be at least equal to the area of the warm air outlet of the grating. Section 5, D, relative to casing shall not govern when this type of furnace is installed, but the following specification shall be followed: The inner and outer casing of this type of furnace may be made of either black or galvanized iron not lighter than No. 26 U. S. Standard Gauge. A uniform air space shall be maintained at all points between the inner and outer casing. In no case shall the top of the heater be allowed closer than twelve inches (12") to any ceiling or joists above the furnace.

(2) Where joists are cut to accommodate this furnace, headers shall be put in and braced.

(3) Section Four for determining area of warm air pipe shall not govern in figuring a pipeless furnace.

(4) Where one warm air register face is used and separate face or faces for cold air supply are used, then Section No. 5 E, G and H shall apply.

K. Permit.

(1) It shall be unlawful for any person, persons, firm or corporation to construct, replace or install any warm air heating furnaces or appurtenances thereto within the City of Chicago without first obtaining from the Commissioner of Buildings a permit to do such work, for which said person, persons, firm or corporation shall pay to said Commissioner of Buildings for the use of said City, for each furnace installed, renewed or repaired the sum of five dollars (\$5.00).

(2) No heating permits shall be required for minor repair work. By minor repair work is meant the incidental repairs to furnaces, which shall not affect the general action of the system, such as renewal of grates, smoke pipes and resetting old furnace in same location; or renewing of single warm air pipes in basement; but when additional runs or new stacks are installed, a permit shall be required, for which the person, firm or corporation installing said additional runs or new stacks shall pay to the Commissioner of Buildings for the use of said City, the sum of one dollar (\$1.00) for each outlet.



Administration Bldg., A. E. Staley Mfg. Co., Decatur, Ill.
J. L. Simmons Company, Builders Aschauer & Waggoner, Architects

J. L. SIMMONS COMPANY

Incorporated.

BUILDERS

ARCHITECTURAL, INDUSTRIAL,
and
PUBLIC WORKS CONSTRUCTION

OFFICES

CHICAGO

SPRINGFIELD

DECATUR

BLOOMINGTON

ILLINOIS

L. Inspection.

(1) It shall be the duty of the Commissioner of Buildings to cause an inspection to be made of all warm air furnaces and the appurtenances thereto hereafter installed by an inspector who is an experienced and competent Journeyman Sheet Metal Worker and see that same is installed or constructed in conformity to the provisions of this ordinance. The expenses of such inspection shall be paid out of the fees received for permits to install or construct such warm air furnaces and appurtenances.

(2) Inspection of new work in new buildings shall be made as follows: When such work has proceeded to where the stacks to upper floors and heads for all side wall registers have been installed, boots connected thereto, the contractor, or person obtaining permit for this work, shall notify the Commissioner of Buildings, who shall make or cause to be made an inspection of such work. Upon finding that the work complies in all respects with the terms of this ordinance there shall be affixed by said Commissioner of Buildings, or his representative, to each stack register head, a certificate stating that the work complies with the ordinance relating thereto.

(3) Inspection of new work in buildings already constructed, shall be made only after installation is completed.

(4) Final inspection of plant shall be made after the whole is connected up and ready to operate.

(5) It shall be unlawful for any person to lath over, plaster or cover up any warm air heating work before such work in new buildings or completed buildings where plaster and lath have been removed has been inspected and certificates above referred to have been attached. The Commissioner of Buildings shall have the right and authority to remove or order removed all such lath, plaster or other coverings which may have been placed over such work before same has been inspected. The person, persons, firm or corporation ordering or causing such work to be covered up, or in any way violating any section of this ordinance as herein set forth, shall, upon conviction, be subject to the penalties set forth for violation of the terms of this chapter.

Section 6. Registration). It shall be unlawful for any person, firm or corporation to engage in the business of installing gravity warm air heating plants with necessary appurtenances thereto as heretofore defined without being registered as a warm air furnace heating and installing contractor in the manner hereinafter set forth provided, however, that if such person, firm or corporation is already registered for the current year in another city or village within the State of Illinois, such contractor shall not be required to be registered or to pay a registration fee in this city.

Section 7. Application for Registration). Any person, firm or corporation desiring to engage in the business of warm air furnace heating and installing contractor shall apply

for registration to the Commissioner of Buildings. Upon the filing of such application in proper form and the payment of registration fee fixed herein, the Commissioner of Buildings shall register the applicant as a warm air furnace heating and installing contractor and shall issue to the applicant a Certificate of Registration which will authorize the applicant to engage in such business for the year in which it is issued; providing that such applicant has filed with the City Clerk an Indemnifying Bond as hereinafter set forth. The Commissioner or Buildings shall keep a suitable record of such registrations.

Section 8. Bond). Prior to the issuance of a certificate of registration for warm air furnace heating and installing contractor, the applicant shall file with the City Clerk of the City of Chicago, an indemnifying bond with good and sufficient sureties in the penal sum of ten thousand dollars (\$10,000.00) such bond being payable to the City of Chicago, for the use of any persons, firms or corporations with whom such applicant shall thereafter contract to do work, to indemnify any such persons, firms or corporations for damages sustained on account of the failure of such applicant to perform the work so contracted for, in accordance with the provisions and requirements of the City of Chicago relating to the installation of gravity warm air heating plants with necessary appurtenances thereto.

Section 9. Fee for Registration—Term). The fee for registration as a warm air furnace heating and installing contractor shall be fifty dollars (\$50.00) per annum which sum shall be paid by the applicant to the City Clerk in advance upon filing his application. The certificate of registration issued thereunder shall expire on the 31st day of December of the year in which it is issued.

Section 10. Validity). Should any section or provision of this ordinance be held unconstitutional or invalid by any court, all other sections and provisions shall nevertheless be deemed as effective as though such unconstitutional or invalid section or provisions had never been inserted in this ordinance.

Section 11. All ordinances, or parts of ordinances, inconsistent with the provisions of this ordinance are hereby repealed.

Section 12. Penalty). Any person, firm or corporation that shall engage in the business of a warm air furnace heating and installing contractor without obtaining a certificate of registration as herein provided for, or that shall violate any of the provisions of this ordinance shall be fined not less than fifty dollars (\$50.00) nor more than two hundred dollars (\$200.00) for each offense, and a separate and distinct offense shall be regarded as committed every day on which such person, firm or corporation shall continue to operate contrary to the provisions of this ordinance.

Section 13. This ordinance, including the provisions and penalty therein set forth, shall take effect and be in force from and after its passage and due publication.



Apartment House now under construction at 1242 Lake Shore Drive,
Chicago, Illinois

Robert S. De Golyer & Co., Architects

Turner Construction Company

Founded 1902

Builders of nearly 1300 Buildings in 27 Years

228 North La Salle Street, Chicago

Special Rulings of the Building Department of the City of Chicago

These rulings are not a part of the Code of the City of Chicago; but are requirements of the Building Department.

BRACING OF TRUSSES, COLUMNS, WALLS, ETC., IN STEEL SKELETON CONSTRUCTION.

I.

In regard to Section 781 of the Revised Building Ordinances, the Commissioner has ruled that the following interpretation shall be placed upon the section concerning bracing:

(a) All skeleton buildings, trusses, and structures shall be securely braced during erection by guys, cables or such other temporary supports as may be necessary to provide for stresses due to erection.

(b) Special wind bracing shall be provided in steel skeleton buildings over one hundred (100) feet in height or higher than twice the least width.

(c) For permanent construction bracing shall be so designed that the skeleton will be self-supporting and safe against lateral and bucking or crippling forces before any of the inclosing walls or roofs are built in place.

(d) In cases where wind forces are nominal and to prevent buckling or crippling, the minimum amount of bracing required shall be $\frac{3}{4}$ " rod for steel tension members or equivalent in other material. Compression members shall be limited in length to one hundred and fifty (150) times the least radius of gyration or otherwise as specified in the Ordinances.

(e) Trusses shall be properly anchored to the walls at the point of bearing in such a way as not to strain the masonry on account of the temperature stresses in the truss.

(f) In general, all eccentric loading on the foundations shall be avoided and where not possible to do so, proper bracing between opposite walls shall be provided, sufficient to offset the bending moment due to eccentricity.

NOTES ON REINFORCED CONCRETE DESIGN.

II

(a) In regard to Section 763, as applying to a combination of tile and concrete construction, the Commissioner has ruled that the width of flange of the concrete joists may be assumed as the full distance c. to c. of ribs but not exceeding eight (8) times the thickness of the concrete on top of tile fillers, plus the average width of rib.

(b) In computing the shear at supports, the average width of the concrete rib plus the thickness of the tile on one side of the rib may be figured as the effective width of joist, provided that joints in tile are properly staggered.

(c) When steel or plaster fillers are used between concrete joists, the width of flange shall be limited to three-fourths ($\frac{3}{4}$) of the distance center to center of ribs as per Section 763.

In regard to Section 760 (e)

(a) When compression is applied to a surface of concrete of at least twice the loaded area, a stress of thirty (30) per cent of the ultimate may be allowed, and

(b) In continuous beams and girders the compressive stress in extreme fibre at the support may be fifteen (15) per cent greater than at the center of span.

In regard to Section 762 (1)

The total amount of steel required for square slabs with two-way reinforcement may be reduced twenty (20) per cent by gradually increasing the rod spacing from the third point to the edge of the slab.

THE DESIGN OF FLAT SLABS SHALL BE IN ACCORDANCE WITH THE FOLLOWING RULING.

III

Definitions.

(1) Flat slabs as understood by this ruling are reinforced concrete slabs, supported directly on reinforced columns with or without plates or capitals at the top, the whole construction being hingeless and monolithic without any visible beams or girders. The construction may be such as to admit the use of hollow panels in the ceiling or smooth ceiling with depressed panels in the floor.

(2) The column capital shall be defined as the gradual flaring out of the top of the column without any marked offset.

(3) The drop panel shall be defined as a square or rectangular depression around the column capital extending below the slab adjacent to it.

(4) The panel length shall be defined as the distance center to center of columns of the side of a square panel, or the average distance center to center of columns of the long and short sides of a rectangular panel.

Columns.

(5) The least dimension of any concrete column shall be not less than one-twelfth ($\frac{1}{12}$) the panel length, nor one-twelfth ($\frac{1}{12}$) the clear height of the column.

Slab Thickness.

(6) The minimum total thickness of the slab in inches shall be determined by the

$$\text{formula: } t = \frac{W \frac{1}{2}}{44} = \text{square root of } W \text{ divided by forty-four, where } t = \text{total thickness of slab in inches, } W = \text{total live and dead load in pounds on the panel, measured center to center of columns.}$$

(7) In no case shall the thickness be less than one thirty-second of the panel length ($\frac{L}{32}$) for floors, nor one-fortieth of the panel length ($\frac{L}{40}$) for roofs, (L being the distance center to center of columns).

(8) In no case shall the thickness of slab be less than six inches (6") for floors or roofs.

Column Capital.

(9) When used the diameter of the column capital shall be measured where its vertical thickness is at least one and one-



Jackson-Franklin Building, 301-315 W. Jackson Blvd., Chicago, Ill.
Alfred S. Aischuler, Inc., Architects

McLennan Construction Company

HUGH McLENNAN, President

BUILDING CONSTRUCTION

307 North Michigan Avenue

CHICAGO

Phone Central 0615

half inches ($1\frac{1}{2}$ "), and shall be at least two hundred and twenty-five thousandths (.225) of the panel length.

The slope of the column capital shall nowhere make an angle with the vertical of more than forty-five degrees. Special attention shall be given to the design of the column capital in considering eccentric loads, and the effect of wind upon the structure.

Drop Panel.

(10) When used, the drop panel shall be square or circular for square panels and rectangular or elliptical for oblong panels.

(11) The length of the drop shall not be less than one-third of the panel length ($L/3$) if square, and not less than one-third of the long or short side of the panel respectively, if rectangular.

(12) The depth of the drop panel shall be determined by computing it as a beam, using the negative moment over the column capital specified elsewhere in this ruling.

(13) In no case, however, shall the dimensions of the drop panel be less than required for punching shear along its perimeter, using the allowable unit shearing stresses specified below.

Shearing Stresses.

(14) The allowable unit punching shear on the perimeter of the column capital shall be three-fiftieths ($3/50$) of the ultimate compressive strength of the concrete as given in section 759 of the building ordinance. The allowable unit shear on the perimeter of the drop panel shall be three one-hundredths ($3/100$) of the ultimate compressive strength of the concrete. In computing shearing stress for the purpose of determining the resistance to diagonal tension the method specified by the ordinance shall be used.

Panel Strips.

(15) For the purpose of establishing the bending moments and the resisting moments of a square panel, the panel shall be divided into strips known as strip A and strip B. Strip A shall include the reinforcement and slab in a width extending from the center line of the columns for a distance each side of this center line equal to one-quarter ($1/4$) of the panel length. Strip B shall include the reinforcement and slab in the half width remaining in the center of the panel. At right angles to these strips, the panel shall be divided into similar strips A and B, having the same widths and relations to the center line of the columns as the above strips. These strips shall be for designing purposes only, and are not intended as the boundary lines of any bands of steel used.

(16) These strips shall apply to the system of reinforcement in which the reinforcing bars are placed parallel and at right angles to the center line of the columns, hereinafter known as the two-way system, and also to the system of reinforcement in which the reinforcing bars are placed parallel, at right angles to and diagonal to the center line of the columns hereinafter known as the four-way system.

(17) Any other system of reinforcement in which the reinforcing bars are placed in circular, concentric rings and radial bars, or systems with steel rods arranged in any manner, whatsoever, shall comply with the requirements of either the two-way or the four-way system herein specified.

Bending Moment Coefficients, Interior Panel, Two-way System.

(18) In panels where standard drops and column capitals are used as above specified, the negative bending moment taken at a cross-section of each strip A at the edge of the column capital or over it, shall be taken

$$\text{as } \frac{WL}{30}$$

(19) The positive bending moment taken at a cross-section of each strip A midway between column centers, shall be taken as

$$\frac{WL}{60}$$

(20) The positive bending moment taken at a cross-section of each strip B in the

$$\text{middle of the panel shall be taken as } \frac{WL}{120}$$

(21) The negative bending moment taken at a cross-section of each strip B on the center line of the columns shall be taken as

$$\frac{WL}{120}$$

(22) In the formulas hereinabove given "W" = total live and dead load on the whole panel in pounds,

"L" = panel length, center to center of columns.

Bending Moment Coefficients, Interior Panel, Four-way System.

(23) In panels where standard drops and column capitals are used as above specified, the negative bending moment taken at a cross-section of each strip A at the edge of column capital or over it, shall be taken as

$$\frac{WL}{30}$$

(24) The positive bending moment taken at a cross-section of each strip A, midway between column centers shall be taken as

$$\frac{WL}{80}$$

(25) The positive bending moment taken at a cross-section of each strip, B, taken in the middle of the panel shall be taken as

$$\frac{WL}{120}$$

(26) The negative bending moment taken at a cross-section of each strip B on the center line of the columns shall be taken as

$$\frac{WL}{120}$$

Bending Moment Coefficients, Wall Panels.

(27) Where wall panels with standard drops and capitals are carried by columns and girders built in walls, as in skeleton construction, the same coefficients shall be used as for an interior panel, except as follows: The positive bending moments on strips A and B midway between wall and first line of columns shall be increased twenty-five (25%) per cent.

(28) Where wall panels are carried on new brick walls, these shall be laid in Port-



Residence of Mr. John Mills, Jr., Winnetka, Ill.

Sloan & Johnson, Architects

ROBERT BLACK COMPANY

Building Contractors

FACTORIES, WAREHOUSES, INDUSTRIAL,
HIGH GRADE RESIDENCES, AND REMODELLING.

122 South Michigan Avenue

CHICAGO

Phones Wabash 8780-8781

land cement mortar and shall be stiffened with pilasters as follows: If a sixteen-inch wall is used, it shall have a four-inch pilaster. If a twelve-inch wall is used, it shall have an eight-inch pilaster. The length of pilasters shall be not less than the diameter of the column, nor less than one-eighth ($\frac{1}{8}$) of the distance between pilasters. The pilasters shall be located opposite the columns as nearly as practicable, and shall be corbeled out four inches at the top, starting at the level of the base of the column capital. Not less than eight (8") inches bearing shall be provided for the slab, the full length of wall.

The coefficients of bending moments required for these panels shall be the same as those for the interior panels except as provided herewith: The positive bending moments on strips A and B midway between the wall and first line of columns shall be increased fifty (50%) per cent.

(29) Where wall panels are supported on old brick walls, there shall be columns with standard drops and capitals built against the wall which shall be tied to the same in an approved manner, and at least an eight-inch bearing provided for the slab, the full length. Where this is impracticable, there shall be built a beam on the underside of slab adjacent to the wall between columns, strong enough to carry twenty-five (25%) per cent. of the panel load.

The coefficients of bending moments for the two cases of slab support herein described shall be the same as those specified in Sec. 27 and Sec. 28 for skeleton and wall bearing condition respectively.

(30) Nothing specified above shall be construed as applying to a case of slabs merely resting on walls or ledges, without any condition of restraint. These shall be figured as in ordinary beam and girder construction specified in the Ordinances.

Bending Moment Coefficients, Wall and Interior Columns.

(31) Wall columns in skeleton construction shall be designed to resist a bending moment of $\frac{WL}{60}$ at floors and $\frac{WL}{30}$ at roof. The

amount of steel required for this moment shall be independent of that required to carry the direct load. It shall be placed as near the surface of the column as practicable on the tension sides, and the rods shall be continuous in crossing from one side to another. The length of rods below the base of the capital and above the floor line shall be sufficient to develop their strength through bond, but not less than forty (40) diameters, nor less than one-third ($\frac{1}{3}$) the clear height between the floor line and the base of the column capital.

(32) The interior columns must be analyzed for the worst condition of unbalanced loading. It is the intention of this ruling to cover ordinary cases of eccentric loads on the columns by the requirement of Sec. 5. Where the minimum size of column therein specified is found insufficient, however, the effect of the resulting bending moment shall be properly divided between the adjoining slab and the columns above and below according to best principles of mechanics and the columns enlarged sufficiently to carry the load safely.

Bending Moment Coefficients, Panels Without Drops, or Capitals, or Both.

(33) In square panels where no column capital or no depressions are used, the sum total of positive and negative bending mo-

ments shall be equal to that computed by the following formula:

$$B.M. = \frac{WL}{8} (1.53 - 4k + 4.18 k^2)$$

where B.M. = numerical sum of positive and negative bending moments, regardless of algebraic signs.

W = total live and dead load on the whole panel.

L = length of side of a square panel, c. to c. of columns.

K = ratio of the radius of the column or column capital to panel length, L.

This total bending moment shall be divided between the positive and the negative moments in the same proportion as in the typical square panels for two-way or four-way systems specified above for interior and wall panels respectively.

Points of Inflection.

(34) For the purpose of making the calculations of the bending moment at the sections away from the column capitals, the point of inflection shall be considered as being one-quarter ($\frac{1}{4}$) the distance center to center of columns, both cross-wise and diagonally, from the center of the column.

Tensile Stress in Steel and Compressive Stress in Concrete.

(35) The tensile stress in steel and the compressive stress in the concrete to resist the bending moment shall be calculated on the basis of the reinforcement and slab in the width included in a given strip, and according to the assumption and requirements given in sections 758 to 761 inclusive of the building ordinance.

The steel shall be considered as being concentrated at the center of gravity of all the bands of steel in a given strip.

(36) For the four-way system of reinforcement the amount of steel to resist the negative bending moment over the support in each strip A shall be taken as the sum of the areas of steel in one cross band and one diagonal band. The amount of steel to resist the positive bending moment of each strip B shall be considered as the area of the steel in a diagonal band. The amount of steel to resist the positive bending moment in each strip A shall be considered as the area of the steel in a cross-band, and the amount of steel to resist the negative moment in each strip B shall be the steel included in the width of strip B.

(37) For the two-way system of reinforcement the amount of steel to resist the bending moment in any strip shall be considered as the area of steel included in the width of the strip.

(38) In both systems of reinforcement the compressive stress in the concrete in any strip shall be calculated by taking the area of steel considered for each strip, and applying it in a beam formula based on the principles of section 761 of the building ordinance.

(39) Where drop panels are used, the width of beam assumed to resist the compressive stresses over the column capital shall be the width of the drop.

(40) The width of beam where no drop panels are used, shall be the width of steel bands. Where this is found insufficient, the area shall be increased by introducing compression steel in the bottom of slab.



3000 Sheridan Road Bldg.

Robert S. De Golyer, Architect

LONGBEACH 4670

H. JANISCH & COMPANY

Building Construction

1801-1813 WINONA STREET

CHICAGO

Rectangular Panels.

(41) When the length of panel in either two-way or four-way system does not exceed the breadth by more than five (5%) per cent, all computations shall be based on a square panel whose side equals the mean of the length and breadth, and the steel equally distributed among the strips according to the coefficients above specified.

(42) In no rectangular panel shall the length exceed the breadth by more than one-third (1/3) of the latter.

Rectangular Panels, Four-Way System.

(43) In the four-way system of reinforcement where length exceeds breadth by more than five (5%) per cent, the amount of steel required in strip A, long direction, both positive and negative, shall be the same as that required for the same strip in a square whose length is equal to the long side of the rectangular panel.

(44) The amount of steel, strip A, short direction, positive and negative, shall be the same as that required for the same strip in a square panel, whose length is equal to the short side of the rectangular panel.

(45) The amount of steel in strip B, positive and negative, shall be the same as that required for similar strip in a square panel whose length is equal to the mean of the long and the short side of the rectangular panel.

(46) In no case shall the amount of steel in the short side be less than two-thirds (2/3) of that required for the long side.

Rectangular Panels, Two-way System.

(47) In the two-way system of reinforcement the amount of steel required for the positive and the negative moment of each strip A shall be determined in the same manner as indicated for the four-way system above.

(48) The amount of steel in strip B, positive and negative, running in short direction, shall be equal to that required for the same strip in a square panel whose length equals the long side of the rectangular panel.

(49) The amount of steel in strip B, long direction, positive and negative, shall be equal to that required for the same strip in a square panel, whose length equals the short side of the rectangular panel.

(50) In no case shall the amount of steel in strip B, long direction, be less than two-thirds (2/3) of that in the short direction.

Walls and Openings.

(51) Girders and beams shall be constructed under walls, around openings and to carry concentrated loads.

Spandrel Beams.

(52) The spandrel beams or girders shall, in addition to their own weight and the weight of the spandrel wall, be assumed to carry twenty (20%) per cent of the wall panel load uniformly distributed upon them.

Placing of Steel.

(53) In order that the slab bars shall be maintained in the position shown in the design during the work of pouring the slab, spacers and supports shall be provided satisfactory to the Commissioner of Buildings. All bars shall be secured in place at intersections by wire or other metal fastenings. In no case shall the spacing of the bars exceed nine inches (9"). The steel to resist the negative moment in each strip B shall extend one-quarter (1/4) of the panel length beyond the center line of the columns in both directions.

(54) Splices in bars may be made wherever convenient, but preferably at points of minimum stress. The length of splice beyond the center point, in each direction, shall not be less than forty diameters (40d) of the bars, nor less than two feet (2'0"). The splicing of adjacent bars shall be avoided as far as possible.

(55) Slab bars which are lapped over the column, the sectional area of both being included in the calculations for negative moment, shall extend not less than twenty-five one-hundredths (.25) of the panel length for cross-bands, and thirty-five one-hundredths (.35) of the panel length for diagonal bands, beyond the column center.

Computations.

(56) Complete computations of interior and wall panels and such other portions of the building as may be required by the Commissioner of Buildings shall be left in the office of the Commissioner of Buildings when plans are presented for approval.

Test of Workmanship.

(57) The Commissioner of Buildings or his representative may choose any two adjacent panels in the building for the purpose of ascertaining the character of workmanship. The test shall not be made sooner than the time required for the cement to set thoroughly, nor less than six weeks after the concrete has been poured.

(58) All deflections under test load shall be taken at the center of the slab, and shall be measured from the normal unloaded position of the slab. The two panels selected shall be uniformly loaded over their entire area with a load equal to the dead load plus twice the live load, thus obtaining twice the total design load. The load shall remain in place not less than twenty-four (24) hours. If the total deflection in the center of the panel under the test load does not exceed one eight-hundredth (1/800) of the panel length, the slab may be placarded to carry the full design live load. If it exceeds this amount of deflection, and recovers not less than eighty per cent (80%) of the total deflection within seven days after the load is removed, the slab may be placarded to carry the full design live load. If the deflection exceeds the allowable amount above specified, and the recovery is less than eighty per cent (80%) in seven days after the removal of the test load, other tests shall be made on the same or other panels, the results of which will determine the amount of live load the slabs will be permitted to carry.

General.

(59) The design and the execution of the work shall conform to the general provisions and the spirit of the Chicago Building Ordinances in points not covered by this Ruling, and to the best engineering practice in general.

Enforcement.

(60) This ruling shall be in effect on and after March first, Nineteen Hundred and Eighteen (March 1st, 1918), and shall supersede all previous rulings on flat slabs.

Signed: CHAS. BOSTROM,
Commissioner of Buildings.

FIREPROOFING OF REINFORCED CONCRETE COLUMNS.**IV**

In reference to Section 762-j and Section 776 of the Chicago Building Ordinance, the Commissioner has ruled that in buildings classed as ordinary construction the full section of the column may be calculated in columns reinforced with vertical rods only. In buildings classed as slow burning or mill construction, the outside one and one-half inches shall not be figured in columns reinforced with vertical rods only, and in buildings classed as fireproof construction the outside two inches shall not be figured in the strength of columns with vertical rods only. When spiral reinforcement is used, only the area within the core shall be figured in accordance with Section 764-b.



MIDLAND BUILDING

CHICAGO

K. M. Vitzthum & Co. Inc.
Architects

Jno. J. Burns
Associate

Brussel, Black & Viterbo
Structural Engineers

John D. Small
Mechanical Engineer

DUFFY-NOONAN
CONSTRUCTION
COMPANY

BUILDERS

CHICAGO

CAISSONS.

V

Ruling.—In determining the area required for concrete caissons, the load on the caissons shall be the load for which the basement column was designed, and the allowable stress on the concrete shall be as given in Section 746 (a). The allowable stress used shall be the stress at the top of the caisson when caissons rest on rock. All caissons supporting such parts of buildings that exceed 260 feet in height shall rest on rock. Other caissons are permitted to be stopped before the rock is reached and the allowable stress used in such cases shall be calculated at the junction of the caisson and the lower bell. The allowable load on the soil for such caissons as do not rest upon rock shall include the weight of the caisson.

Approved: FRANK E. DOHERTY,
Commissioner of Buildings.

Ruling.

The diameter of a caisson may be increased for the purpose of forming a so-called bell at its lower extremity. The ratio of increase shall not exceed one unit of radius for each two units of added length or depth; and in no case shall the slope of the bell be flatter than that thirty degrees with the perpendicular axis of the caisson.

The diameter at the bottom of the bell shall not exceed two and one-eighth times the diameter of the caisson proper, and said diameter shall be further limited to an ultimate dimension not to exceed three-fourths of the distance between the center of the column it supports and the center of the nearest adjacent column.

FRANK E. DOHERTY,
Commissioner of Buildings.

A RULING ON COUNTERBALANCE OF STAIRWAY FIRE ESCAPES.

VI

The Commissioner of Buildings has made a ruling in regard to the construction of the movable part of stairway fire escapes as follows:

All counterbalance stairway fire escapes hereafter constructed shall conform to the following requirements in addition to those specified in the Building Ordinance for fixed stairway fire escapes, Section 882.

(a) The stringer carrying the counterweight may be built of steel channels, angles or "I" beams or any combination thereof, not less than eight inches deep and $\frac{3}{4}$ " metal, but it shall be so designed that the maximum fibre stress over the support shall not exceed 8,000 pounds per square inch and the moment of inertia about the vertical axis parallel to the web of the stringer shall not be less than 33% of the moment of inertia about the horizontal axis perpendicular to the web and passing through the center, which shall be accomplished by riveting an angle or angles onto the channel or "I" beam stringer.

(b) The same section of stringer shall be continued for equal distances on either side of the support and the reinforcement shall be extended as close to the counterweight as practicable.

(c) The truss rod from the counterweight to the opposite end of the stringer shall always be used either as an independent brace or in connection with the railing to prevent any sag of the stringer and shall be at least $\frac{3}{4}$ " in diameter firmly connected, the strength of connection to be sufficient to develop the strength of the rod, but in figuring stresses, the stringer must be assumed to carry the total dead and live load as required by the ordinance.

(d) The connection between the stringer and the supporting rod must be designed to stiffen the stringer securely against horizontal or twisting motion by means of a steel casting or forging riveted to the stringer both through the web and the flange.

ILLUMINATED AND OTHER ROOF SIGNS OF STEEL SKELETON CONSTRUCTION.

VII

In regard to Section 919, of revised Building Ordinances, the Commissioner has ruled that all illuminated roof signs of steel construction shall conform to the following specific requirements:

(a) All compression members shall be proportioned by the usual formula, $16,000-70l$ except that the length of the main or principal members R may be increased to one hundred and seventy-five (175) times the least radius of gyration, and the length of all secondary or sub-members may be increased to two hundred (200) times the same.

(b) The anchorage of every roof sign shall be designed with a factor of safety not less than two (2). I. e., there shall be at least twice as much weight of masonry or concrete resisting the pull on the anchors as figured from the overturning effect of wind.

(c) The thickness of all structural steel members shall not be less than one-fourth ($\frac{1}{4}$) of an inch.

Chicago, March 15th, 1916.

With reference to Section 743 (h) of the Revised Building Ordinances, the Commissioner has ruled that,

(a) Whenever two or more rows of piles are required, the distance between the center lines shall not be less than the largest diameter of the piles.

(b) When a single staggered row of piles is used, the distance between the center lines shall not be less than one-half the largest diameter of the piles, except that in one-story buildings or walls less than twenty feet high a single row without any staggering may be used.

(c) The piles shall be driven so that the distance between centers shall not be less than twice the largest diameter nor two feet six inches minimum.

RULING GOVERNING THE MINIMUM THICKNESS OF METALS.

VIII.

In steel construction exposed to the weather, no metal in principal members shall be less than 5-16 inch thick, except the webs of "I" beams or channels which may be $\frac{1}{4}$ inch thick but not less. For secondary members, no metal shall be less than 1-4 inch thick, except that webs of channels or "I" beams used as secondary members may be 3-16 inch thick, but not less. This ruling is not to apply to electric signs or fire escapes or canopies.

In steel construction protected by buildings no metal in a principal member shall be less than 1-4 inch thick, except that closed sections filled with concrete and the webs of channels and "I" beams may be 3-16 inch thick, but not less. For secondary members metal may be 3-16 inch, but not less.

The above rulings to take effect August 28 1916.

RULING ON REINFORCED CONCRETE FLOORS.

IX.

In regard to Sec. 776 referring to fireproofing concrete floors, the Commissioner has ruled that the following interpretation shall apply to concrete joist and floor tile construction:

(a) Whenever a combination of reinforced concrete joists and hollow burned clay tile fillers is used, the same shall be assumed same as solid concrete slabs as far as fireproofing of steel rods is concerned.

(b) Whenever a system of concrete joists and steel or plaster domes instead of clay tiles is used, whether same is left in place or withdrawn afterwards, the combination shall be assumed and be subject to same re-



Bernard Edward Sunny Gymnasium, University of Chicago

Armstrong, Furst & Tilton, Architects

BULLEY & ANDREWS

FREDERICK BULLEY, President



GENERAL CONTRACTORS AND BUILDERS

2040 West Harrison Street

CHICAGO

TELEPHONE WEST 6805

quirements as reinforced concrete beams and girders, with the exception that steel reinforcement in the top of the joists may be considered as in solid slab construction.

(c) Whenever cement plaster ceiling on metal lath is used in connection with the latter type of construction, one-half inch may be deducted from the required amount of fireproofing at the bottom and the sides of joists, provided that cement plaster not less than three-fourths inches thick be applied directly to the under side of joists.

RULING GOVERNING STAR-SHAPED COMPRESSION MEMBERS.

X.

In regard to columns or struts built of two angles placed back to back in star-shape \perp , the Commissioner has ruled that the same should comply with the following specifications:

1. Star-shaped compression members shall be tied together by pairs of batten plates or pairs of angle lugs in opposite directions spaced not more than three (3) times the width of main member center to center of each successive pair.

2. Each batten plate or angle lug shall have enough rivets connecting it to each angle of the column or strut to be able to transfer fifteen (15%) per cent of total stress in the member from one angle to the other through the rivets when these are figured in single shear.

3. Minimum size of rivets shall be as follows:

$\frac{7}{8}$ " diameter for 8" angles.

$\frac{3}{4}$ " diameter for 6", 5" and 4" angles.

$\frac{5}{8}$ " diameter for 3" and 2 $\frac{1}{2}$ " angles.

4. Minimum spacing of rivets shall be three (3) inches for single row and two and one-half (2 $\frac{1}{2}$) inches for double row, staggered, measured parallel to the gage lines. When two gage lines are used, rivets must be staggered.

5. Minimum thickness of strut angles or batten plates shall be one-fourth of an inch ($\frac{1}{4}$) when exposed to weather, and three-sixteenth (3-16) inches when protected within a building, but batten plates or angle lugs shall not be less than two-thirds (2-3) the thickness of the main compression members.

Supplementing a ruling of August 28, 1916, with regard to the minimum thickness of steel structural members, the following ruling is made. This new ruling will effect only such members as are included within the ruling itself. It being strictly understood that the members considered in this ruling shall be used nowhere in the building other than in the floor panels in connection with the construction of tile or terra cotta floors and that no such member shall be used for the support of any masonry or other structure or part thereof, that lies without the confines of a floor panel. It is further strictly understood that these members shall be attached to the principal members by bolting or riveting as per present ordinance requirements for standard members and in no other manner.

The skeleton frame of all structures shall be considered as the columns and all girders, beams, trusses, or spandrels having rigid connections to the columns. The members of floor or roof panels which have no connection to the columns, shall be considered as secondary members.

The skeleton frame and secondary members shall be designed and constructed to carry all dead, live and other loads to which they may be subjected, both during erection and after completion of the structure. All members shall be such that the developed stresses under loads which they carry can be satisfactorily determined by the analytical methods of engineering practice.

The skeleton frame shall provide all the necessary rigidity for the structure, and the

floor and roof panels shall not be considered as affecting the vertical rigidity except that in completed structures the floor and roof panel construction may be designed and considered as carrying floors and their loads to such parts of the skeleton frame as are designed to carry the horizontal forces to the foundations.

The secondary members of floor or roof panels shall be integral rolled structural steel of I Section, and may have about one-third or more the weight and section modulus of standard beams of same depth when the unit stresses and deflection do not exceed those specified in code. Secondary members shall be rigidly connected to the skeleton frame, properly supported on interior masonry walls, on shelf angles, or on the flanges of beams or girders.

Secondary members shall have a bearing of not less than 4 inches on such masonry walls and when supported on shelf angles or the flanges of beams or girders, shall extend not less than 2 $\frac{1}{2}$ inches past the edge of the supporting member and be rigidly connected to same.

Secondary members as described shall be laterally braced at not less than six feet longitudinal intervals. The center to center spacing of secondary members in floor or roof panels shall be determined by their capacity to sustain the loads which they carry.

The unit stress in secondary members in floor or roof panels shall not exceed those provided in the building ordinances.

The above ruling to take effect April 1, 1927.

(Signed) FRANK E. DOHERTY,

Commissioner of Buildings.

CINDER FILLS ON BUILDINGS.

XI.

Cinder fill on Buildings will be figured at the rate of 66 lbs. per cubic foot unless evidence of exact weight is furnished.

PLATFORMS FOR GRAVITY TANKS.

XII.

Platform beams supporting gravity tanks shall have webs $\frac{3}{8}$ " thick or more, where the webs are inaccessible for painting the web shall be not less than $\frac{3}{8}$ " thick.

RIVETS IN TENSION.

XIII.

When rivets are used in tension in wind bracing they may be figured at 18,000 lbs. per square inch if machine driven and 15,000 lbs. per square inch if hand driven.

ROOF ARCHES OF WOOD, STEEL, RE- INFORCED CONCRETE, STONE OR MASONRY.

XIV.

Use the usual methods given in standard text books on elastic arches fixed or hinged at the ends, for obtaining the critical moments and shears.

The stresses shall be figured on the following basis:—

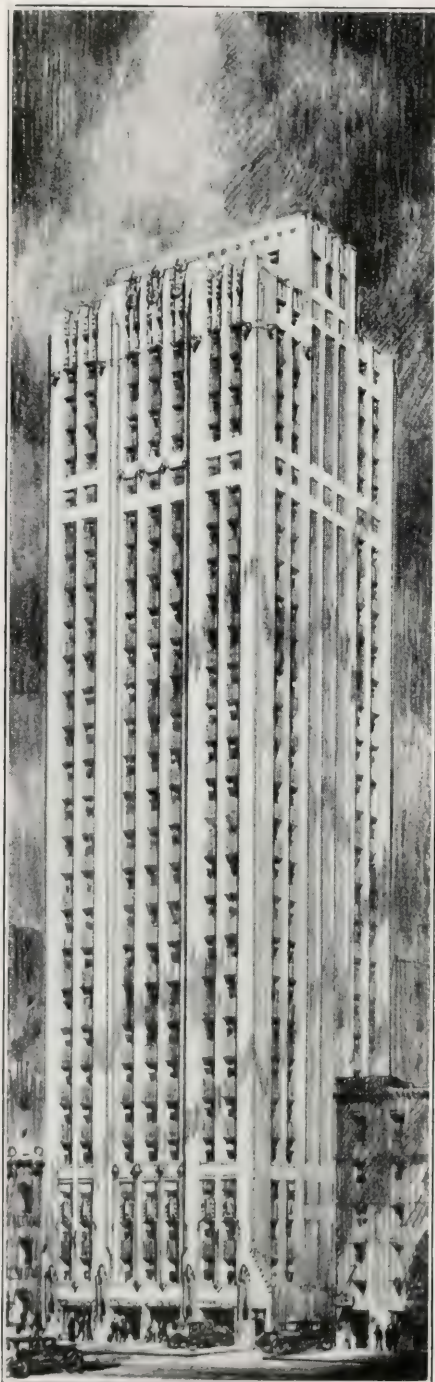
(1) For the actual dead load acting on the full span of the arch.

(2) For a vertical live load of 25 pounds per sq. ft., acting on such lengths of the arch as will give the maximum moments and shears.

(3) For a horizontal wind-load of 20 pounds per sq. ft. acting on one-half of the arch obtain the normal wind brace, Duchemin's Formula. If rollers are used under one end of arch, the wind-load shall be assumed to act on either side of the structure.

(4) For a temperature effect of 50 degrees F. above and below the average.

(5) For the actual maximum erection stresses possible.



"Ruth Automatic Garage"
329-335 Plymouth Ct., Chicago
Ruth Safety Garages, Inc., Owner
A. S. Graven, Inc., Architect



Under Construction

by

**J.B.FRENCH
COMPANY**

Builder

30 N. Michigan Ave.

CHICAGO, ILLINOIS

Telephone, State 0766



For loadings (1), (2), (3), (4) and (5) combined or for the critical combination of these loadings the stresses given in the Ordinance may be increased (50) per cent.

Apply the ordinary Column-Formulas to the arch, considering the arch as a curved column of a length equal to $\frac{1}{2}$ the length of the arch. Do the same thing laterally, by considering the arch as a straight column of a length equal to the spacing of the struts of the lateral bracing system.

Figure the Monent stresses in the arch same as in an ordinary beam.

When rollers are used under one end of the arch, such arch shall be analyzed for a wind load acting on either side of the roof. The maximum stresses for any load or combination of loadings shall be considered.

Approved by the Commissioner of Buildings, November 8, 1921.

CONCRETE JOIST AND TILE CONSTRUCTION.

XV.

In regard to Section 776 applied to concrete joist and tile construction:

(a) When a combination of concrete joist and clay tile filler is used, it shall be assumed the same as solid concrete slab as far as fireproofing steel rods are concerned.

The top shall, for all floors and for fireproof roofs, have a minimum thickness of 2 inches, and for roofs other than fireproof a minimum thickness of $1\frac{1}{2}$ inches. The reinforcing rods perpendicular to the joists shall be spaced not more than 12-inch centers, and must contain an equivalent of $\frac{1}{4}$ round spaced 12-inch centers.

(b) When a system of concrete joist and steel or plaster domes is used, whether the domes are left in or withdrawn, the combination shall be subject to the same requirements as reinforced concrete beams and girders, except that the steel in top may be considered as in solid slab construction.

The minimum thickness of top for a fireproof floor or roof without cinder concrete over shall be $2\frac{1}{2}$ inches, and with cinder concrete or other fireproof material over shall be 2 inches. For other floors the minimum thickness shall be 2 inches, and for other roofs $1\frac{1}{2}$ inches.

When plaster ceiling either suspended or applied directly on the underside of the joists, on metal lath is used, one-half inch may be deducted from the required amount of fireproofing at the bottom and sides of the joists.

The reinforcing rods in the top perpendicular to the joists shall be spaced not more than six times the thickness of the slab and must contain an equivalent of $\frac{1}{4}$ round, spaced 12-inch centers.

(c) The thickness and reinforcing referred to above, for tops of floors, are the minimum requirements. The design must meet the necessities of the loads and spans in all respects.

This ruling to be effective until negated by the Commissioner of Buildings.

BRICK STACKS.

XVI.

The allowable extreme fibre stress in tension for brick stacks or for plain or radial terra cotta stacks shall not exceed 17.5 pounds per square inch, when laid in a mortar composed of at least one part Portland cement to one part lime and three parts sand.

Approved by the Deputy Commissioner,
ROBERT KNIGHT.

RULING FOR REINFORCED CONCRETE HOOPED COLUMNS.

XVII.

Reinforced concrete hooped columns may be used for longer lengths than twelve (12)

times the least width, provided the maximum working unit stress on the core of such axially loaded columns is determined by the formula:

$$\frac{P^1}{P} = 1.40 - \frac{L}{120 R}$$

where

P^1 = total safe axial load on long columns.

P = total safe axial load on column of the same section, whose L/D is less than 12.

R = least radius of gyration of column core.

L = unsupported length of column in inches.

D = least side of column in inches.

Approved July 29, 1924,

FRANK E. DOHERTY.

Commissioner of Buildings.

NOMENCLATURE.

XVIII.

f_s denotes unit fibre stress in steel.

f_g denotes unit fibre stress in gypsum.

E_s denotes modulus of elasticity of steel.

N_g denotes modulus of elasticity of gypsum.

n denotes ratio E_s/E_g .

M_s denotes resisting moment as determined by steel.

M_g denotes resisting moment as determined by gypsum.

M denotes bending moment in general.

b denotes breadth of tile.

d denotes distance from compressive face to the plane of the steel.

k denotes ratio of the depth of the neutral axis of a section below the top to "d."

j denotes ratio of the arm of the resisting couple to "d."

A denotes area of cross-section of steel.

p denotes steel ratio A/bd .

w denotes total uniform load per sq. ft. of tile.

STRESSES.

5"x18"x6'-0" Channel Tile.

Type "D" Mat.

One $\frac{3}{16}$ " rod each rib

Area 2—No. 7 wires=0.0492

3" rods=0.0552

Area 2— $\frac{16 A}{.1044} = 0.1044$ sq. in.

$p = \frac{A}{bd} = \frac{.1044}{18 \times 4.25} = .00136$

$n = 30$ $pn = .0408$

$k = 2 \frac{pn + (pn)^2}{K} = 0.2572$

$j = 1 - \frac{K}{K} = .9143$

$Af_s j d = \frac{3}{8} WL^2 \times 12$ For $f_s = 16000$, $w =$

$Af_s j d = 0.1044 \times 16000 \times .9143 \times 4.25$

$W = \frac{1.5 L^2}{120} = 1.5 \times 36 = 120$ lbs.

$120 = 80$ lbs. per sq. ft. of slab with 16000 lbs.

stress in steel.

$M = \frac{1}{2} WL^2 \times 12 = 6475$ lbs.

$f_g = \frac{2M}{2 \times 6475} = 170$ lbs.

$j k b d^2 = .9143 \times 0.2572 \times 18 \times (4.25)^2$

$120 \times 3 = 16.9$ lbs. per sq. in. in

rib.

$3 + 2 \times 4.25 \times 2 = 2$



Hotel Faust, Rockford, Ill.

Hall, Lawrence & Ratcliffe, Architects

Tel. Dearborn 8721

JOHN E. ERICSSON CO.

**BUILDERS and
GENERAL CONTRACTORS**

123 West Madison Street

CHICAGO

For a total load of 50 lbs per sq. ft. of slab:
 $M = 1.5 \times 75 \times 36 = 4050$ lbs.
 $M = 4050$
 $f_s = \frac{M}{10000} = 10000$ lbs.
 $Ajd = .1044 \times .9143 \times 4.25$
 $2M = 2 \times 4050$
 $f_s = \frac{2M}{jk bd^2} = \frac{2 \times 4050}{.9143 \times 2572 \times 18 \times (4.25)^2} = 106.5$ lbs.
 75×3
 $3 + 2 \times 4.25 \times 2 = 10.6$ lbs. per sq. in. in rib.
 2

STANDARD SPECIFICATIONS COVERING THE MANUFACTURE OF PYROBAR LONG SPAN GYPSUM ROOF TILE FOR USE IN BUILDINGS OF ORDINARY CONSTRUCTION.

Approved September 28, 1923.

By ROBERT KNIGHT

1. The gypsum used shall be second settle stucco, having an ultimate compressive value of not less than 2,000 pounds per square inch.

2. Reinforcing as indicated on sheet headed "Stresses" shall be properly placed and secured in form.

3. Thirty-seven parts by weight of water shall be added to sixty-three parts by weight of second settle stucco, the materials thoroughly mixed and poured in the form, care being taken to see that the reinforcing remains in its proper position.

4. After setting of the gypsum, the tile shall be removed from the form and placed in a kiln until thoroughly dry.

STRESSES IN THE PYROBAR LONG SPAN GYPSUM ROOF TILE SHALL NOT EXCEED VALUE GIVEN BELOW.

1. Tensile stress in steel shall not exceed one-third its elastic limit and shall not exceed 16,000 lbs. per sq. inch.

2. Shearing stress in steel shall not exceed 10,000 lbs. per square inch.

3. Direct compression in gypsum shall be one-fifth of its ultimate strength, but shall not exceed 150 lbs. per square inch. Bending in extreme fibre shall be same value as determined for direct compression.

4. Bearing of gypsum shall not exceed 200 lbs. per square inch.

5. Bond between gypsum and reinforcing steel shall not exceed the following values:
 21 lbs. per sq. in. for plain square bars.
 25 lbs. per sq. in. for plain round bars.

30 lbs. per sq. in. for bars with mechanical bond.

6. Tension in gypsum. Gypsum is assumed not to take tension, and full reinforcement is always provided.

7. Shearing stress in plain unreinforced gypsum shall not exceed 6 lbs. per square inch. When reinforcing is provided for diagonal tension and the horizontal steel is properly anchored, the shearing stress on the gypsum may be increased to 20 lbs. per square inch.

COMPOSITION.

Physical.

Percentage of gaging water for standard consistency.

37. Dry bulk—cc's per gm. .88.

Fineness—through 100 mesh, 84.6%.

Chemical.

Percentage moisture combine water....	5.83
C & O.....	37.00
CaSO ₄	52.00
Insoluble silicates.....	3.12
Fe ₂ O ₃.....	.67
Al ₂ O ₃.....	.52
CaO.....	trace
CaCO ₃	
CO ₂	
MgO.....	
NaCl.....	.07

PYROBAR GYPSUM ROOF TILE. INGREDIENTS AND PROCESS OF MANUFACTURE.

Gypsum is either quarried or mined, depending upon how far below the surface the gypsum strata occurs. Gypsum is mined in much the same manner as coal. The rock is broken to one man size, then weighed and passed over a set of grates which screen out the smaller pieces. The larger pieces go through a gyratory crusher, and are crushed to what is termed "crushed rock." After leaving the crusher, the rock is run through a rotary screen where it is sized for shipment to the trade and for mill use. After delivery to the mill, it is recrushed in the swing hammer mill to about three-quarters inch size. It is then put through a rotary dryer and the surface moisture removed. The temperature in that dryer is about 150° F. This leaves the crushed gypsum bone dry and ready for grinding. The dry rock is then ground on Munson Mills to a fineness of 85%, through a 100 mesh. It is then fed into the calcining kettles to be calcined. These kettles are cylindrical in shape about 10 feet in diameter, about 15 feet high, and hold approximately twelve tons of stucco.

As the heat is applied, the gypsum commences to give up the water which is chemically combined in it. The temperature to which the gypsum in the kettle is subjected, runs about 380° F. This calcining process takes about an hour and a half, at the end of which time it gradually settles to what might be called a quiescent state. By increasing the temperature to about 450° F., the mass again comes to a boil and settles a second time. It is because of the gypsum settling in the kettle that the plaster is referred to as first or second settle stucco. In first settle stucco, about 75% of the water of crystallization is removed, and in second settle, a little more is evaporated. Second settle stucco makes a great deal denser gypsum, and is used for our long span roof tile and floor tile. First settle stucco is used for wall plaster and partition tile.

After the calcining process, the stucco is fed over the scalping screens, which automatically remove any foreign matter. It is then conveyed to the storage bin.

The second settle stucco or Structolite, as it is termed, is now ready to be made into roof tile. No foreign ingredients are added; simply water and Structolite, using 63% by weight of Structolite and 37% of water.

Ground, dry Structolite, before the water is added, weighs 65 lbs. per cubic foot, and after adding the water, the finished product weighs 77 lbs. per cubic foot.

Approved by Robert Knight, Deputy Commissioner of Buildings, September 28, 1923, for buildings of ordinary construction.

Not valid for gypsum slabs cast in place at the building.

—B. E. W.

Experience

Responsibility

Telephone Winnetka 2040

EDWARD A. ANDERSON COMPANY
INCORPORATED 1913

BUILDING CONSTRUCTION

566 CENTER STREET

WINNETKA

Residential Work of the higher Type

Service

Equipment

CHICAGO ZONING ORDINANCE

(Passed by the City Council of the City of Chicago on April 5, 1923; Approved by the Mayor on April 16, 1923)

AN ORDINANCE.

An Ordinance establishing a plan for dividing the City of Chicago into districts for the purpose of regulating the location of trades and industries and of buildings and structures designed for dwellings, apartment houses, trades, industries, and other specified uses, for regulating the height, volume, and size of buildings and structures, and intensity of use of lot areas, for determining building lines, and for creating a board of appeals.

Be it ordained by the City Council of the City of Chicago:

Section 1. **Interpretation; Purpose.** In interpreting and applying the provisions of this ordinance such provisions shall in every instance be held to be the minimum requirements adopted for the promotion of the public health, safety, comfort, morals or welfare.

Section 2. **Definitions.** Certain words in this ordinance are defined for the purposes thereof (unless there is express provision excluding such construction or the subject matter or context is repugnant thereto) as follows:

(a) Words used in the present tense include the future; the singular number includes the plural and the plural the singular; the word "building" includes the word "structure".

(b) **Alley**—A narrow thoroughfare upon which abut generally the rear of premises, or upon which service entrances of buildings abut, and is not generally used as a thoroughfare by both pedestrians and vehicles, or which is not used for general traffic circulation, or which is not in excess of 30 feet wide at its intersection with a street.

(c) **Apartment House**—A building which is used or intended to be used as a home or residence for two or more families living in separate apartments.

(d) **Auxiliary Use**—A use customarily incidental to and accessory to the principal use of a building or premises located on the same premises with such principal use.

(e) **Block**—A block shall be deemed to be that property abutting on a street on one side of such street and lying between the two nearest intersecting or intercepting streets, or nearest intersecting or intercepting street and railroad right of way or waterway.

(f) **Building**—A building is a structure entirely separated from any other structure by space or by walls in which there are no communicating doors or windows or similar openings.

(g) **Depth of Lot**—The depth of a lot is the mean distance from the front street line of the lot to its rear line measured in the general direction of the side lines of the lot.

(h) **Dwelling House**—A building used or

intended to be used as a home or residence in which all living rooms are accessible to each other from within the building and in which such living rooms are accessible without using an entrance vestibule, stairway or hallway that is designed as a common entrance vestibule or common stairway or common hallway for more than one family, and in which the use and management of all sleeping quarters, all appliances for cooking, ventilating, heating, or lighting, other than a public or community service, are under one control.

(i) **Family**—One or more individuals living, sleeping, cooking and eating on the premises as a single housekeeping unit.

(j) **Grade**—The finished grade of premises improved by a building is the elevation of the surface of the ground adjoining the building. The established grade of premises whether vacant or improved is the elevation of the sidewalk at the property line as fixed by the City. Where the finished grade is below the level of the established grade, the established grade shall be used for all purposes of this ordinance.

(k) **Garage**—A public garage, except as otherwise provided by this paragraph, is a building or premises arranged, designed, and intended to be used for the storage of motor vehicles for hire or reward, or which does not come within the definition of a private or community garage as herein set forth. A private garage is a building with ground area not in excess of 80 square feet arranged, designed, and intended to be used for the storage on the ground floor of not more than 4 individually owned passenger automobiles devoted to the private use of the owner, when such garage is located on the same premises, as an auxiliary use, with the residence or apartment or business of the owner of such automobiles so stored, and where no fuel is sold. A use as a private stable shall be subject to the same ground area regulations for the purposes of this ordinance as the regulations controlling the ground area of a private garage. Where two or more separate private garages, each having a ground area not in excess of 200 square feet, are located on the rear half of the premises, not more than one of such garages having a vehicle entrance on a public street, such garages collectively shall be deemed a community garage, but a group of two or more private garages on a single lot not so located or arranged or any one of which is in excess of 200 square feet in area shall be deemed a public garage.

(l) **Height of Building**—The height of a building shall be the vertical distance measured in the case of flat roofs from the mean level of the established grade to the level of the highest point of the under side of the ceiling beams adjacent to the street, and in the case of a pitched roof from such grade to the mean height level of the under side of



Berry Memorial Parish House
William C. Jones, Architect

Giddings & Leavitt Sts.
Ardmore Construction Co., Builders

Telephone Randolph 1756

ARDMORE CONSTRUCTION CO.

A. FREMONT OLSEN, President

BUILDERS



105 W. Monroe Street

Chicago, Ill.

the rafters of the gable. Where a block has a frontage on a two-level street the upper street level may be used to determine the height of buildings for a distance back from such frontage not in excess of one-half the depth of the block at right angles to such frontage, but not farther back than the alley most nearly parallel to such street in any case. Where a structure is set back from the street line, the mean level of the finished grade of the premises along the line of that part of the structure nearest the street line may be substituted for the established grade for the purpose of determining the height of a building. Where no roof beams exist or there are structures wholly or partly above the roof, the height shall be measured from the established grade or finished grade to the level of the highest point of the building.

Note: See amendment to Section 21, paragraph E.

(m) **Lot**—A parcel of land or premises occupied, or which it is contemplated shall be occupied, by one building with its usual auxiliary buildings or uses customarily incident to it, including such open spaces as are required by this ordinance and such open spaces as are arranged and designed to be used in connection with such building, shall be deemed a lot for the purposes of this ordinance. A corner lot shall be deemed to be that property which has an area not in excess of 8,000 square feet, and which abuts on two streets making an angle on the lot side of not greater than 120 degrees.

(n) **Non-conforming Use**—A non-conforming use is a use which does not comply with the regulations of the use district in which it is situated.

(o) **Public Space**—A park, public square, or submerged land under the jurisdiction of a park district shall be deemed a public space.

(p) **Street**—A thoroughfare used for public foot and vehicle traffic other than an alley as herein defined, shall be deemed a street.

(q) **Street Line**—The street line is the dividing line between a street and the lot. The front street line shall be deemed to be the shortest street line.

(r) **Street Wall**—The street wall, for the purposes of this ordinance, shall be deemed that wall or part of a wall of a building, or that part of the wall of a porch or other structure, nearest to and most nearly parallel with the street, extending more than 4 feet 6 inches above the finished grade.

(s) **Volume of Building**—The volume of a building shall be the contents in cubic feet of that space between the grade used in determining the height of buildings and the mean level of the roof (except as otherwise specifically provided by Section 16, Paragraph (a),) including scenery, lofts and other storage spaces, cooling towers, elevator bulkheads, towers, penthouses, water tanks or water towers, dormers, bays, covered ways, covered porches or other spaces not open to the sky, and courts, provided that certain courts or certain parts thereof opening on thoroughfare or public spaces, cornices projecting beyond the exterior walls, piers or columns, or the space under the projection of a cornice, chimneys, parapet walls, structures extending into thoroughfares or public spaces, architectural finials or open framework wireless towers shall not be included as a part of the volume of a building. No court except an open court unobstructed from the street or alley or other public place by walls for its full width shall be excluded from the volume of a building. An offset court opening on an open court but having a wall between the offset court and the thoroughfare or public place, or that part of a court not open to the sky, shall not be within the definition of an open court or of a part of an open court. The distance between the mean level of the top of the enclosing walls of the court and the mean level of the bottom of the court

shall be used to determine the volume of such court.

Section 3. **Use of Districts.** For the purpose of classifying, regulating and restricting the location of trades and industries and the location of buildings designed for specified industrial, business, residential, and other uses, the City of Chicago is hereby divided into four classes of districts: (1) Residence districts, (2) Apartment districts, (3) Commercial districts, and (4) Manufacturing districts; as shown on the use district map which accompanies this ordinance. The said use district map, consisting of forty-nine separate parts all of which are sections of the same map covering the entire territory of the City, the volume district map, also containing forty-nine parts each of which relates to the corresponding part of the use district map, and the index map and chart containing the explanation of symbols and indications which appear on said use district and said volume district maps, are hereby made a part of this ordinance. The use districts designated on said map are hereby established. No building shall be erected nor shall buildings or premises be used for any purpose other than a purpose permitted by this ordinance in the use district in which such building or premises is or are located.

Section 4. **Residence Districts.** (a) In a Residence district no building or premises shall be used nor shall a building be erected, altered, or enlarged which is arranged, intended, or designed to be used for an A, C, or M use as defined hereinafter. In a Residence district no building or premises shall be used nor shall any building be erected, altered, or enlarged which is arranged, intended, or designed to be used except for R uses or special uses exclusively as hereinafter provided.

(b) For the purposes of this ordinance, R uses are hereby defined as uses designed for and permitted in Residence districts and conforming to the provisions relating to such districts; and all R uses are classified as R1, R2, R3, or R4 uses as follows:

R1 Use—An R1 use shall include every use as a dwelling house.

R2 Use—An R2 use shall include every use as golf or tennis grounds or similar use, church, convent, parish house, public recreation building, community center building, music school, university, public school, juvenile dancing school, or a private or boarding school or college unless such private or boarding school or college is operated so as to bring it within the definition of a C use.

R3 Use—An R3 use shall include every use as a public park, public playground, or railway passenger station.

R4 Use—An R4 use shall include every use as a tree or plant nursery, farm, truck garden, greenhouse (unless such greenhouse is operated as a retail business), and a railway right of way not including yard tracks or industrial tracks.

Section 5. **R Use Limitations.** In a Residence district no building shall be erected or used and no building shall be erected which is arranged, intended, or designed for an R2 use unless such building or use is located—

On premises adjoining a street under the jurisdiction of a park district;

On premises adjoining or across a street or alley from a railway right of way;

On premises on the same street and adjoining premises or directly across a street from premises where there exists a building devoted to an R2 or R3 or special use as hereinafter defined;

On corner premises diagonally or directly across a street from premises upon which is maintained an R2 or R3 or special use;

On premises entirely surrounded by streets or alleys;

On premises three sides of which adjoin streets;

On premises adjoining or immediately across a street from an Apartment, Commercial or Manufacturing district;

"INDIVIDUALITY"



Tremont Club, 5427-29 Kenmore Ave., Chicago

Hyland & Corse, Architects

Duval Construction Co.

GENERAL
CONTRACTORS

180 West Washington Street

STATE 7970

On premises adjoining on the same street premises where there exists a building devoted to a non-conforming use;

On premises already devoted to an R2 or R3 or special use; or

On premises located in a block in which there are no premises devoted to dwelling house purposes.

Section 6. Apartment Districts. (a) In an Apartment district no building or premises shall be used nor shall a building be erected, altered, or enlarged which is arranged, intended, or designed to be used for a C or M use as defined hereinafter. In an Apartment district no building or premises shall be used nor shall any building be erected, altered, or enlarged which is arranged, intended, or designed to be used except for R or A uses or special uses exclusively as hereinafter provided.

(b) For the purposes of this ordinance, A uses are hereby defined as uses other than R uses, designed for and permitted in Apartment districts and conforming to the provisions relating to such districts; and all A uses are classified as A1, A2, or A3 uses as follows:

A1 Use—An A1 use shall include every use as an apartment house.

A2 Use—An A2 use shall include every use as a boarding house, lodging house, or a hotel which is maintained within the limitations in Apartment districts imposed thereon by this ordinance.

A3 Use—An A3 use shall include every use as a public library, public museum, public art gallery, hospital or sanitarium, an eleemosynary institution except as otherwise classified, or a private club excepting a club the chief activity of which is a service customarily carried on as a business.

Section 7. Auxiliary Uses in Residence or Apartment Districts. (a) Auxiliary uses which do not alter the character of the premises in respect to their use for residential purposes shall be permitted in Residence and Apartment districts. Auxiliary uses shall include the following, but the enumeration of such cases shall not be deemed to prevent proper auxiliary uses that are not referred to:

Signs advertising the premises for sale or for rent which are located (if space occupied by buildings does not prevent) not nearer to adjoining premises than 8 feet or nearer to a street line than the building line established by this ordinance;

The office of a surgeon, physician or dentist, located in the dwelling or apartment used as the private residence of such surgeon, physician or dentist;

Customary home occupation located in a dwelling, studio, or apartment and carried on only by the members of the household of the person occupying such dwelling, studio, or apartment as his private residence, provided no window or other display or sign is used to advertise such occupation;

The renting of one or more rooms or the providing of table board in a dwelling or apartment occupied as a private residence, provided no window or other display or sign is used to advertise such use;

A public dining room or restaurant located in a hotel provided that the public entrance to such dining room or restaurant is from the lobby of the hotel, and further provided that no window or other display or sign is used to advertise such use;

Such facilities or retail shops as are required for the operation of a hotel or apartment house, or for the use or entertainment of guests or tenants of the hotel or apartment house, when conducted and entered only from within the building; provided no street window or other exterior display or other exterior sign is used to advertise such use; and further provided that in an apartment district which is also in a 4th or 5th volume district, at any time after ten years from the time of the passage of this ordinance but not previously (and no construction shall be given to the following language which would permit the uses therein named or any of

them before the expiration of said ten year period), an auxiliary use shall be deemed to include a retail shop on the ground floor of an apartment house or hotel (which apartment house or hotel is not less in height than 120 feet), such shop having a store front with show windows on and an entrance from a street, with such signs only as are on the glass of said window or entrance door; provided, however, that no such retail shop, such store front or entrance, or such sign shall be used for any purpose or business (1) which is not suitable to the neighborhood and to the main occupancy of said apartment house or hotel, (2) which involves the trucking of material through the abutting or adjacent streets or alleys in sufficient quantities to produce undue congestion in such streets or alleys or to interfere with the usual functioning of those streets or alleys, or (3) which is of such character as an automobile or automobile tire or accessory business, or heavy machinery display or sales room, garage, meat market, bakery, grocery store, hardware store, ice cream parlor, soda water fountain, gasoline filling station, street front lunch room or cafeteria, undertaking establishment, laundry, amusement place, or any other use of an objectionable character; and the specific enumeration above of certain uses shall not be held to exclude other uses which are unsuited to the neighborhood although not specifically enumerated.

Private dining halls, dormitories, printing presses, students' laboratories or workshops, playgrounds, athletic fields, or other customary facilities in connection with an R2 use;

A news or refreshment stand or restaurant in connection with a passenger station;

Recreation and service buildings in a public park or public playground;

A private garage or private stable in connection with an R use, limited in ground area to 10 per cent of the area of the lot, but not in excess of the ground area prescribed for or in excess of the capacity limits of a private garage; provided, however, that a private garage or private stable in connection with an R use shall not be located on the same lot with another private garage or private stable or community garage;

A private garage or private stable or community garage in connection with an A use in an Apartment district, limited in ground area to 15 per cent of the area of the lot, provided that a community garage auxiliary to an A1 use shall not be composed of a greater number of private garages than the number of separate dwelling apartments located on the same lot.

(b) Auxiliary uses shall not include:

A garage or stable in connection with a non-conforming use except a private garage or private stable whose ground area does not exceed 10 per cent of the area of the lot;

A driveway or walk used for access to a C or M use;

A billboard, signboard or advertising sign, store, trade, business, garage or stable, except such as are hereinbefore specifically permitted.

Section 8. Commercial Districts. (a) In a Commercial district no building or premises shall be used nor shall a building be erected, altered, or enlarged which is arranged, intended, or designed to be used for M uses as defined hereinafter. In a Commercial district no building or premises shall be used nor shall any building be erected, altered, or enlarged which is arranged, intended, or designed to be used except for R, A, or C uses or special uses exclusively as hereinafter provided.

(b) For the purposes of this ordinance, C uses are hereby defined as uses other than R and A uses, designed for and permitted in Commercial districts, and conforming to the provisions relating to such districts; and all C uses are further defined and classified as C1, C2, or C3 uses as follows:

C1 Use—A C1 use shall include every use as

THOS. G. GAGE CO.

General Contractors

64 WEST RANDOLPH STREET

Chicago, Ill.

TELEPHONE CENTRAL 6645

Airplane hangar or airplane repair shop;
Amusement park or pier, skating rink, baseball park, or race track, if such park or pier, rink, baseball park, or track is operated as a business for purposes of private profit;
Armory or arsenal, except where ammunition is manufactured;

Automobile repair shop, automobile parts or tire repair or vulcanizing shop, public garage, automobile fuel or service station;

Advertising sign;

Convention hall;

Driveway or walk used for access to any C or M use;

Financial institution;

Greenhouse operated as a retail business;
Internal combustion engine operated in connection with any use permitted in a Commercial district, provided such engine is equipped and operated only with a competent muffling device;

Office;

Public or private institution, except an institution otherwise classified;

Railroad or water freight station, or storage, team, loading or unloading track or private track, or wharf; provided that the handling of materials, products, or articles at such station, track, or wharf shall be subject to the same limitation and restrictions as apply to the district in which the station, track, or wharf is located;

Restaurant, laundry, theatre, dance hall, billiard room or bowling alley, if such restaurant, laundry, theatre, dance hall, billiard room or bowling alley is operated as a business for purposes of private profit.

As amended July 25, 1927, and further amended July 11, 1928.

Retail store, retail trade, vocation, profession, or shop for custom work or the making of articles to be sold at retail on the premises to the ultimate consumer, storage in warehouse of materials or products permitted as a C2 use; provided the operation of such store, trade, vocation, profession, shop, or storage does not involve the handling of materials, products, or articles across the public sidewalks in sufficient or considerable amounts so as to interfere with the free, safe, and continuous passage of pedestrians along such walks; and provided such store, trade, vocation, profession, shop, or storage does not involve the handling or trucking of materials, products, or articles, through the abutting or adjacent streets or alleys in sufficient quantities as to produce undue congestion in such streets and alleys or interfere with the usual functioning of those streets or alleys;

School for dancing except as hereinbefore classified, trade or vocational school other than an M use, horseback riding school;

Wholesale sales office or sample room;

Provided the operation of any such specified use is not offensive or noxious by reason of the emission of odors, fumes or gases, dust, smoke, noise or vibrations.

C2 Use—A C2 use shall include all uses not otherwise classified, provided all materials and products are stored and all manufacturing operations are carried on entirely within substantial buildings completely enclosed with walls and roof, and provided no operations are of such a nature as to become offensive or noxious to the occupants of adjoining residence or apartment uses by reason of the emission of odors, fumes or gases, dust, smoke, noise, or vibrations; and C2 uses shall include such uses as

Carpet cleaning, provided no dust is permitted to escape from the building;

Cigars, cigarettes, or smoking tobacco manufacturing;

Clay or glass products manufacturing, decorating, or assembling, provided no individual kiln capacity exceeds 200 cubic feet and no kiln is fired except by oil, gas, or electricity;

Cotton, wool, flax, hair, hemp, leather, felt, paper, cardboard, cork, rubber, fur, feathers, horn, bone, shell, celluloid, fiber articles or products manufacturing, or the manufactur-

ing of articles or products from similar materials, but not including uses otherwise classified;

Felt manufacturing, provided no dust is permitted to escape from the building;

Ink manufacturing, not including the preparation of linseed or resin oils;

Lumber sawing, planing, dressing, shaping, pressing, turning, bending, carving, assembling, including carpenter shop for any kind of repairing or manufacturing except as otherwise classified whether or not the product is sold at retail on the premises;

Metal planing, shaping, bending, grinding, milling, drilling, die sinking, forging (except an M use), coring, punching, stamping, pressing, soldering, welding, riveting (other than snap riveting), buffing, polishing, or finishing, plating, galvanizing, sherardizing, tempering, annealing, hardening, other than by processes or operations which emit odor or noise of a disagreeable or annoying nature for the manufacturing of metal products; casting of aluminum, babbitt, brass, bronze, iron, lead, white metal for the manufacture of metal products, provided no metals are melted except in melting pot the capacity of which does not exceed 500 pounds or in electric furnace the capacity of which does not exceed 500 pounds, and further provided no pneumatic chippers are employed; assembling, not including an M2 or M3 use, of metal products or parts, or of metal assembled with other materials, except by processes or operations which emit noise of a disagreeable or annoying nature; sheet metal, tin, copper, brass workers' shop, plumbing shop, wagon shop, or machine shop, whether or not the product or service is sold at retail on the premises;

Painting, enameling, japanning, lacquering, oiling, staining, or varnishing shop, whether or not the product or service is sold at retail on the premises;

Pharmaceutical products, toilet preparations, patent or proprietary medicines, or baking powder manufacturing, provided no toxic or corrosive fumes, offensive odors or dust are permitted to escape from the building;

Rubber products manufacturing from Para, plantation or non-ill-smelling African rubbers in which sulphur chloride is not used;

Shoddy or shoddy felt manufacturing, provided no dust is permitted to escape from the building;

Storage of such materials or products as acids, bark, broom corn, cotton, chemicals, clothing, drugs, dry goods, eggs, farm products, feed, food products, fruits, furniture, glass, groceries, hardware, hemp, hops, household goods, ice, junk, jute, liquors machinery metals, millinery, naval or ship stores, paint, paper, pipes, plaster, produce, rags roofing materials, rice, rope, rubber, scenery, shop or mill supplies sugar, tobacco, textiles, vegetable fibre such as hemp, jute or others not specifically mentioned, waste paper, wines, wood; storage in underground tanks of oils, petroleum or inflammable fluids in quantities and under conditions permitted by other ordinances;

Wholesale produce salesroom or market;

Wholesale, packing, repacking, labeling, consigning or storage warehouse; also

Every use of manufacturing, assembling, repairing, packing, finishing, or storage, or any legal use not otherwise classified, if conducted wholly within a building generally occupied by more than one manufacturing use and customarily called a loft building, without serious annoyance or injury to other usual occupants of the same building and without affecting by reason of noxious odors, fumes or gases, or excessive dust, noise, vibration, or danger, a business or other use or activity which is customarily carried on or may be carried on wholly within the same loft building with the C2 use or which may be conducted on adjacent premises.

C3 Use—A C3 use shall include, provided all materials and products are stored and all



University of Chicago, Medical Group

from drawings by Coolidge & Hodgdon, Architects
erected under general contract by

WILLIAM ADAMS CO.

**GENERAL CONTRACTORS
AND BUILDERS**

Established 1890

Incorporated 1896

Telephone Armitage 1521

1530 North Damen Avenue

CHICAGO

manufacturing operations are carried on entirely within substantial buildings completely enclosed with walls and roof, and provided no operations are of such a nature as to become offensive or noxious to the occupants of adjoining premises devoted to or adapted for other uses, by reason of the emission of odors, fumes or gases, dust, smoke, noise, or vibrations, the following uses:

Brewery;

Cement products such as concrete blocks, pipe, garden furniture manufacturing;

Custom dyeing or cleaning, clothes cleaning, steam cleaning;

Distilled liquors or spirits manufacturing except an M use;

Feed manufacturing, except from refuse, offal or tankage;

Food products, beverages, confections manufacturing, preparation, compounding, baking, canning, packing, or bottling, including the grinding, cooking, roasting, preserving, drying, smoking, or curing of meats, fruits, or vegetables, except a C1 use or a use otherwise classified;

Fuel distributing station (except a C1 use) from which fuel is sold at retail and where all fuel is unloaded from carriers and loaded upon carriers and stored entirely within substantial enclosed buildings, provided the operation of said station is carried on without the emission of dust or noise;

Ice manufacturing for purposes of sale;

Milk or ice distributing station from which truck or wagon deliveries are customarily made;

Poultry killing, packing, or storage for purposes of sale at wholesale;

Paint or enamel blending, including all operations except operations which are M uses or other processes from which offensive or noxious odors, gases or fumes escape from the building;

Soap manufacturing from refined oils or fats, provided competent condensers or other appliances shall be operated where necessary to comply with the definition or the intended definition of a C3 use, and excepting the use of low grade greases, oils or tallow or other ingredients which emit noxious odors;

Stable for the housing of more than 8 horses or cows, livery or boarding or sales stable.

Section 9. Auxiliary Uses in Commercial Districts. (a) Auxiliary uses shall be permitted in a Commercial district. An auxiliary use to a C1 or C2 use shall not include a stable for the housing of more than 8 horses or cows or a livery or boarding stable.

(b) An auxiliary use in a Commercial district shall include an M1 storage use as hereinafter defined, provided such M1 storage use shall not occupy in excess of 50 per cent of that part of any premises wholly within a Commercial district, nor shall such M1 storage use be located nearer to a Residence or Apartment district than 50 feet, and further provided that such M1 use shall not be located nearer to a street upon which the C use abuts than 50 feet where a Manufacturing district does not adjoin the same street in the same block or in a block directly across the street from the C use, but an auxiliary M1 use shall in any case be permitted in that part of a Commercial district within 50 feet of a railroad right of way other than a street railway.

(c) An auxiliary use shall not include an M1 use other than storage, nor an M2 or M3 use as hereinafter defined.

Section 10. C Use Limitation. (a) A C1 use shall not include a C2 or C3 use. A C2 use shall not include a C3 use.

(b) No C2 use which is not auxiliary to and incidental to a C1 use, if such C2 use is located in that part of a Commercial district which is nearer at any point to a Residence or Apartment district than 125 feet, shall be operated between the hours of 8 P. M. and 6 A. M. if such operation involves the trucking or hauling of materials or products dur-

ing such hours or if such operation involves processes of a nature such as to disturb the occupants of said Residence or Apartment districts between the hours of 8 P. M. and 6 A. M.

(c) No C2 use or part thereof, except a storage warehouse or more than one of such uses collectively or individually, together with auxiliary uses thereto, shall be established on more than one-half of the total floor space of a building located in that part of a Commercial district which is nearer than 125 feet at any point to a Residence or Apartment district, but floor space equal to the ground area of any premises in such part of a Commercial district may be occupied by C2 uses in any case although in excess of the said one-half; and such part of a Commercial district located within 135 feet of a railroad right of way other than a street railway, or located adjoining or across a street or across an alley from a Commercial district which is not restricted by the provisions of this paragraph or from a Manufacturing district, shall be exempt from the floor space restrictions of this paragraph. That portion of a building or premises wholly within such part of a Commercial district shall be deemed a separate building or separate premises for the purpose of determining the areas limited by the provisions of this paragraph.

(d) No C3 use or part thereof, together with auxiliary uses thereto, shall be established in that part of a Commercial district which is nearer at any point to a Residence district or Apartment district than 125 feet.

(e) No opening in the side or rear wall or roof of a public garage shall be nearer to the boundary line of a Residence or Apartment district than 16 feet.

Section 11. Manufacturing Districts. (a) In a Manufacturing district no building or premises shall be used nor shall a building be erected, altered, or enlarged which is arranged, intended, or designed to be devoted to a use prohibited in the City of Chicago by any other ordinance. In a Manufacturing district no building or premises shall be used nor shall any building be erected, altered, or enlarged which is arranged, intended, or designed to be used except for R, A, C, or M uses or special uses exclusively as hereinafter provided.

(b) For the purpose of this ordinance, an M use is hereby defined as any use for an occupation, business or activity other than an R, A, or C use, that may lawfully be carried on within the city and shall include every lawful use except an R, A, or C, or special use. All M uses are further defined and classified as M1, M2, or M3 uses as follows:

M1 Use—An M1 use shall include such storage, manufacturing or other uses of property coming within the definition of an M use as do not injuriously affect the occupants of adjacent uses and are so operated that they do not emit dust, gas, smoke, noise, fumes, odors, or vibrations of a disagreeable or annoying nature.

An M1 storage use shall include such uses as

Above ground tanks for the storage of oils, petroleum or other inflammable fluids in quantities not greater than 3,000 cubic feet, except as prohibited or otherwise regulated by other ordinances;

Wholesale lumber yard, retail or mill lumber yard; wood yard; the storage in bulk or in yard or in shed of such products or materials as articles manufactured or in the process of manufacture (except as otherwise classified), asphalt, bark, barrels, boxes, brick, cement, cord wood, cotton, contractor's equipment, crates, creosoted products, gravel, iron, junk, lime, machinery, pipe, plaster, rags, roofing, sand, scrap iron, scrap paper, stone, tar, terra cotta, timber, vehicles; or the stor-



I. K. Stover Residence, Hill Road, Winnetka, Ill.

S. S. Beman, Architect

CADENHEAD CO.



GENERAL CONTRACTORS



8 East Huron Street

Phone SUPERior 1474

CHICAGO

age of any other products or materials which do not emit dust, gas or odors of a disagreeable or annoying nature.

An M1 use, provided such use does not customarily emit dust, gas, smoke, noise, fumes, odors, or vibrations which may be offensive or noxious to the adjacent R or A or C uses and does not injure the operation of adjacent C or M uses, shall include also every such use as

Bleaching and dying of yarns, textiles, or felt in case sulphur colors or materials which create offensive odors are not used.

As amended July 25, 1927, and further amended July 17, 1928.

Chalk, graphite, emery, corundum, carborundum, whiting, mercury salts, white lead, red lead, zinc salts, lithopone, plaster, pumice, or talc products manufacturing from the dry materials, or the manufacturing of products from other dust producing materials; provided no operation is contrary to the general definition of an M1 use;

Clay, glass, or shale products manufacturing except a C2 use, including the refining or blending of the raw materials;

Crematory except a crematory located in a cemetery;

Fabricating, other than snap riveting or processes used in bending and shaping of metal which emit noises of a disagreeable or annoying nature, for assembling metal products; forging of metals, melting, casting of metals or manufacturing of steel or alloys of steel from iron, provided no cupola is employed; and further provided no operation is contrary to the general definition of an M1 use;

Paper or strawboard manufacturing from waste paper stock or pulp board;

Railroad freight, storage or classification yard; railroad shop or roundhouse;

Stone, marble or granite grinding, dressing, or cutting; provided no operation is contrary to the general definition of an M1 use;

Varnish or enamel manufacturing from balsam gums, copal, or spar and turpentine, alcohol or benzine and other ingredients which do not emit disagreeable or noxious fumes or gases;

Or any use not otherwise classified which is not contrary to the general definition of an M1 use and not contrary to the classification of such uses herein made.

M2 Use—An M2 use shall include the uses set forth hereunder, provided such use does not customarily emit dust which is not controlled by competent dust collecting appliances, or such use is one which from the nature of the materials handled or processes customarily employed, emits dust, gas, smoke, noise, fumes, or odors, to such an extent as to affect the health, safety, comfort, morals or welfare of occupants of R or A or C uses located not farther than 400 feet from the M2 use, and which use does not customarily emit corrosive or tarnishing gases or fumes which injure C or M uses distant 100 feet or more from the M2 use, or which does not create vibrations to an extent that would damage buildings or affect the position or alignment of machinery erected with usual permanency on premises distant 100 feet or more from the M2 use; in which classification, subject to the conditions named, is every such use as

Bone grinding from soft bone;

Carpet beating or cleaning;

Chalk, graphite, emery, corundum, carborundum, whiting, mercury salts, white lead, red lead, zinc salts, lithopone, plaster, pumice or talc products manufacturing from the dry materials, or the manufacturing of products from other dust producing materials;

Chewing tobacco or snuff manufacturing;

Coffee roasting or manufacturing of coffee substitutes where roasting of cereals is done;

Dyes manufacturing from coal tar derivatives;

Emery, corundum or carborundum, graphite products manufacturing by the employment of grinding processes;

Foundry compound or parting sand manufacturing;

Fuel gas or illuminating gas manufacture or purification;

Fuel gas or illuminating gas storage or the storage above ground of other inflammable fluids except as otherwise classified;

Fuel pocket, tippie, trestle, dump or yard, wholesale or retail, other than a C3 use;

Grain elevator;

Grease, lard, fat, or tallow rendering or refining, except from refuse or rancid fats;

Linseed oil, or similar oils, manufacturing, boiling, or refining;

Lithopone manufacturing;

Live stock corrals or pens, stock yards;

Metal fabricating processes or the assembling of materials where snap riveting is done, or where processes creating noises permitted in the general definition of an M2 use are carried on, for the manufacturing of such products as locomotive or power plant boilers or similar boilers; cranes, dredges, derricks, excavating buckets, locomotives, railroad and electric cars, ships, steel and wood cars, steel truck bodies; structural and reinforcing steel for buildings, bridges, ships and other structures; wire fence, wire lath and reinforcing wire; forging, melting, heating or casting of metals or their alloys, employing all processes, except a use otherwise classified, for the manufacturing of such products as armor plate, automobile or wagon springs, brake shoes, cast iron pipe, cast iron safes, drop forgings, furnaces, ingot-molds, iron or steel billets, plates, sheets, structural shapes, rails, tubes, molding machinery, railroad car wheels, axles, or springs;

Nail, tack or rivet manufacturing where heading or cutting machines are employed;

Operation of internal combustion engines without competent muffling devices;

Paper manufacturing, except as otherwise classified;

Planing mill;

Plaster or plaster of Paris manufacturing;

Pumice stone grinding or refining;

Rubber products manufacturing from Para, plantation or non-ill-smelling African rubbers, in which sulphur chloride is used;

Sausage casings, gut strings or similar products manufacturing;

Sewage purification by Imhoff, activated sludge or similar processes;

Shellac refining;

Slaughtering;

Shoddy or shoddy felt manufacturing;

Soap manufacturing, except a use otherwise classified;

Soya bean oil, or china wood oil manufacturing or refining;

Stone crushing and screening; stone grinding, cutting or buffing not otherwise classified; stone quarry;

Varnish or enamel manufacturing if animal glues or shellac are used as ingredients of the varnish or enamel;

Vinegar or yeast manufacturing;

White lead or red lead manufacturing; whiting manufacturing;

Or any use not otherwise classified or which is not contrary to the general character of M2 uses as indicated by the classification herein contained and the conditions imposed.

M3 Use—An M3 use shall include all M uses which are excluded from the M1 and M2 classification; including every such use as:

Animal black, bone black or lamp black manufacturing;

Asphalt manufacturing or refining; asphalt or similar preservative coating or impregnation of fibre materials or wood where heat is applied;

Cattle or sheep dip manufacturing;

Chlorine or bleaching powder manufacturing; electrolysis of brine;

Coal distillation, including derivation of such products as gas, ammonia, or coal tar;



Group of Buildings Spanish Court, Kenilworth, Ill.
Edwin H. Clark, Inc., Architects

H. F. FRIESTEDT CO.

Builders

TRIBUNE TOWER



Superior } 5666
 } 5667

CHICAGO, ILL.

Coal tar, refuse grain, fermented refuse grain, bones or wood distillation;
Cottonseed oil, or similar oils, manufacturing, boiling or refining;
Creosote manufacturing or refining;

Dyeing of yarn, textiles, or felt, except a use otherwise classified;

Fertilizer manufacturing from organic matter or minerals;

Fish curing, cooking, smoking or canning; fish oil manufacturing or refining;

Glue, size or gelatine manufacturing, where the processes include the refining or recovery of products from fish or animal refuse or offal;

Grain drying or poultry feed manufacturing from refuse mash from breweries or from refuse grain;

Gypsum refining;
Hydrochloric, nitric, sulphuric, or sulphurous acid manufacturing;

Incineration, drying, or reduction or storage, of garbage, offal, refuse, dead animals or other refuse;

Lime kiln;
Ore or slag pile or dock;

Petroleum or kerosene refining or distillation or derivation of by-products;

Portland, slag, or natural cement manufacturing;

Rubber products manufacturing from or the refining of ill-smelling African or similar rubbers;

Slaughter house refuse, or other refuse, or rancid fats, or refuse dead animals, cooking, boiling, or rendering;

Smelting or refining of such metals or their alloys as aluminum, iron, lead, steel, tin, zinc, from the ores;

Syrup, starch, dextrine, or glucose manufacturing; sugar refining;

Tanning of hides or pelts, also storage, curing or cleaning of raw hides or pelts;

Wool scouring, washing of hair from tanneries, or from slaughter houses; washing of feathers or similar operations;

Or any other use that is lawful within the city, which would be harmful by reason of dust, gas, smoke, noise, fumes, odors, vibrations, soot, sudden fire or explosion or any other causes to a use otherwise classified at a distance of 2,000 feet or more from the M3 use; provided the uses set forth hereunder are not contrary to the provisions of any other ordinance of the City of Chicago.

Section 12. M Use Limitations. (a) An M1 use shall not include an M2 or M3 use and shall not be classified as an M1 use if such M2 or M3 use is present; an M2 use likewise shall not include an M3 use.

(b) No M2 use shall be established nearer to a Residence or Apartment district than 400 feet nor nearer to a Commercial district than 125 feet.

(c) An M3 use shall not be established nearer to a Residence, Apartment or Commercial district than a distance at which the M3 use would not from any cause be offensive or noxious to the occupants of such Residence, Apartment or Commercial district, but the distance of an M3 use from a Commercial district shall not be less than 500 feet nor shall the distance from a Residence or Apartment district be in any case less than 2,000 feet.

Section 13. Special Uses. (a) For the purposes of this ordinance all special uses are classified as follows:

Airdrome;
Street car barn;
Cemetery;
Circus, carnival, carousal, open air or tent show or similar use, operated for purposes of private profit;

Hospital or sanitarium for the care of contagious diseases or incurable patients;

Institution for the care of the insane or feeble-minded;

Penal or correctional institution;

Police or fire station;

Public service water reservoir, filtration plant, or pumping station;

Public service or institutional light, heat or power plant except auxiliary use;

Public utility gas plant, electric station or substation;

Telephone exchange.

(b) A special use or the extension of an existing special use may be located in any district without restriction as to the distance from any other district, provided such location or such extension will not seriously injure the appropriate use of neighboring property.

Section 14. Non-conforming Uses. (a) A non-conforming use existing at the time of the passage of this ordinance may be continued.

(b) A non-conforming use shall not be extended, but the extension of a use to any portion of a building which was arranged or designed for such non-conforming use at the time of the passage of this ordinance shall not be deemed the extension of a non-conforming use.

(c) A building other than an A3 use arranged, designed or devoted to a non-conforming use at the time of the passage of this ordinance may not be reconstructed or structurally altered to an extent exceeding in aggregate cost, during any ten-year period, 50 per cent of the value of the building unless the use of such building is changed to a conforming use.

(d) A non-conforming A3 use may be enlarged or extended within the limitations of the volume district in which it is located.

(e) A non-conforming yard storage use shall not be expanded in area of storage space so used.

(f) A non-conforming advertising sign use if removed from the premises may not be replaced.

(g) A non-conforming use shall not be changed unless changed to a more restricted use; provided, however, that in a Residence district an M use shall not be changed unless changed to a conforming use.

(h) A non-conforming use if changed to conforming use shall not thereafter be changed back to any non-conforming use.

(i) A non-conforming use if changed to a more restricted non-conforming use shall not thereafter be changed unless to a still more restricted use.

(j) In a Residence district an A1 use shall not be changed to an A2 use.

(k) In a Manufacturing district no existing M use shall be deemed to be non-conforming except where such use is nearer at the time of the passage of this ordinance to a Residence or Apartment or Commercial district, as the case may be, than the minimum distance as prescribed by this ordinance.

(l) For the purposes of this ordinance a use shall be deemed to be changed if changed from a use included in a use class to a use not included in such class.

(m) A non-conforming use except as hereinbefore provided shall be deemed to be changed to a more restricted use if the use to which such non-conforming use is changed is a use included in a use class that in the arrangement of classes precedes the class in which such non-conforming use is included. The classes shall be deemed to be arranged in order of precedence as R, A, C1, C2, C3, M1, M2 and M3, as hereinbefore defined.

Section 14A. It shall be unlawful for any person, firm or corporation to carry on or engage in the business of keeping a junk store or a junk yard upon any street in the city upon which is located a street railway line.

Section 15. Size of Building. For the purpose of regulating and limiting the height and bulk of buildings hereafter to be erected, of regulating and limiting the intensity of the use of lot areas, and of regulating and determining the area of open spaces within and surrounding such buildings, the City of Chicago is hereby divided into five classes of districts: 1st Volume district, 2nd Volume

GREAT LAKES CONSTRUCTION CO.

GENERAL CONTRACTORS

333 NORTH MICHIGAN AVE.

PHONE FRANKLIN 6980-1-2

CHICAGO

district, 3rd Volume district, 4th Volume district and 5th Volume district, as shown on the volume district map which accompanies this ordinance, such volume district map being referred to in Section 3, and by said Section 3 made a part of this ordinance. The volume districts designated on said map are hereby established. No building or part of a building shall be erected except in conformity with the regulations herein prescribed for the volume district in which said building is located. No lot area shall be so reduced or diminished nor shall a building be so enlarged that the volume of the building shall be greater or the open spaces shall be smaller than hereinafter prescribed. The open spaces required for a particular building shall not be included as a part of the required lot or yard areas of any other building.

Section 16. 1st Volume District. In a 1st Volume district, (except as provided by Section 21 of this ordinance):

(a) No building, except a building in a Commercial or Manufacturing district, shall occupy more than 50 per cent of the area of a lot if an interior lot or 65 per cent if a corner lot, exclusive of the area hereinbefore provided for a garage, and the aggregate volume in cubic feet of all buildings on a lot exclusive of the volume of certain attic spaces or spaces above the ceiling level of the story next below the roof and exclusive of the ground story of a garage shall not exceed the area of the lot in square feet multiplied by 10 feet where the lot is not a corner lot, or by 13 feet in the case of a corner lot, or by 36 feet in a Commercial or Manufacturing district; provided that 2/10 feet but not more than a total of 2 feet in any case shall be added to the 10 feet or to the 13 feet for each 100 square feet that the lot of record prior to the date of the passage of this ordinance in a Residence or Apartment district is less in area than 3,600 square feet. Attic space, space above the ceiling level of the story next below the roof of a building or any part of a building, space above the enclosing walls of a church or auditorium, or room or that part thereof contained wholly within the roof space above the level of the enclosing wall or walls, may be enclosed in addition to the volume of a building, provided the cubic content of such space or room or such part thereof is not in excess of the cubic content of the space which would be enclosed by a hip roof making angles of 60 degrees with the horizontal springing from a horizontal plane on the enclosing walls or part thereof of such building, church, or auditorium;

(b) At any street line no building or part thereof shall exceed a height of 33 feet. For each 1 foot that a building or portion of it sets back from any street line, such building or such portion thereof may be erected 2 feet in height in excess of 33 feet. No part of a building shall be erected to a height at any point in excess of 66 feet;

(c) For each 1 foot that a building or portion of it is distant from the center line of an alley, such building or such portion thereof may be erected 3 feet in height. No building or portion thereof shall be erected nearer the center line of an alley than 8 feet;

(d) For each 1 foot that a building or portion of it sets back from all lines of adjacent premises, such building or such portion thereof may be erected 3 feet in height in excess of 30 feet, provided that along lines of adjacent premises in a 2nd Volume district the setback regulation required along lines of adjacent premises in a 2nd Volume district shall apply, and further provided that along the lines of adjacent premises in a 3rd or 4th or 5th Volume district no setback shall be required. For the purpose of this paragraph the height of a building shall be the mean level of the top of a parapet wall or the mean level of the top of the structure. Chimneys are exempt from the provisions of this paragraph.

Section 17. 2nd Volume District. In a 2nd volume district (except as provided by Section 21 of this ordinance):

(a) Located within a Residence or Apartment district no building shall occupy more than 60 per cent of the area of a lot if an interior lot or 75 per cent if a corner lot, exclusive of the area hereinbefore provided for a garage, and the aggregate volume in cubic feet of all buildings on a lot exclusive of the ground story of a garage shall not exceed the area of the lot in square feet multiplied by 40 feet, or by 50 feet in the case of a corner lot, except that 1 per cent but not more than a total of 5 per cent shall be added to the 60 per cent or 75 per cent respectively for each 100 square feet that the lot of record prior to the date of the passage of this ordinance is less in area than 3,600 square feet;

(b) Located within a Commercial or Manufacturing district the aggregate volume in cubic feet of all buildings on a lot shall not exceed the area of the lot in square feet multiplied by 72 feet.

(c) At any street line no building or any part thereof shall exceed a height of 66 feet. For each 1 foot that a building or portion of it sets back from any street line, such building or portion thereof may be erected 2 feet in height in excess of 66 feet. No part of a building shall be erected to a height at any point in excess of 132 feet;

(d) For each 1 foot that a building or portion of it is distant from the center line of any alley, such building or such portion thereof may be erected 5 feet in height and no building or portion thereof shall be erected nearer to the center line of an alley than 8 feet; provided these regulations shall not be applied along that part of an alley for the 55 feet of its length nearest the street which the alley intersects;

(e) Located within a Residence or Apartment district for each 1 foot that a building or portion of it sets back from any line of adjacent premises, such building or such portion thereof may be erected 3 feet in height in excess of 44 feet, provided that along lines of adjacent premises in a 3rd or 4th or 5th Volume district, this setback regulation shall not be required. Chimneys are exempt from the provisions of this paragraph.

Section 18. 3rd Volume District. In a 3rd Volume district (except as provided by Section 21 of this ordinance):

(a) Located within a Residence or Apartment district no building shall occupy more than 75 per cent of the area of a lot if an interior lot or 90 per cent if a corner lot, exclusive of the area hereinbefore provided for a garage, and the aggregate volume in cubic feet of all buildings on a lot exclusive of the ground story of a garage shall not exceed the area of the lot in square feet multiplied by 100 feet, or by 120 feet in the case of a corner lot;

(b) Located within a Commercial or Manufacturing district the aggregate volume in cubic feet of all buildings on a lot shall not exceed the area of the lot in square feet multiplied by 144 feet;

(c) At any street line no building or part thereof shall exceed a height of 132 feet. For each 1 foot that a building or portion of it sets back from any street line, such building or such portion thereof may be erected 2 feet in height in excess of 132 feet. No part of a building shall be erected to a height at any point in excess of 198 feet;

(d) For each 1 foot that a building or portion of it is distant from the center line of any alley, such building or such portion thereof may be erected 7 feet in height and no building or portion thereof shall be erected nearer to the center line of an alley than 8 feet, provided these regulations shall not be applied along that part of an alley for the



Hospital for the Little Company of Mary, Evergreen Park, Ill.

Joe W. McCarthy, Architect

W. J. LYNCH COMPANY

Building
Construction

844 RUSH STREET

Chicago

55 feet of its length nearest the established building line on the street which the alley intersects.

Section 19. 4th Volume District. In a 4th Volume district (except as provided by Section 21 of this ordinance):

(a) The aggregate volume in cubic feet of all buildings on a lot shall not exceed the area of the lot in square feet multiplied by 216 feet, or by 240 feet in the case of a corner lot which is located also in a Residence or Apartment district; in a Residence or Apartment district the area provisions of Section 18, paragraph (a) shall apply;

(b) At any street line no building or part thereof shall exceed a height of 198 feet. For each 1 foot that a building or portion of it sets back from any street line, such building or such portion thereof may be erected 3 feet in height in excess of 198 feet. No part of a building shall be erected to a height in excess of 264 feet;

(c) For each 1 foot that a building or portion of it is distant from the center line of any alley, such building or such portion thereof may be erected 9 feet in height, provided this regulation shall not be applied along that part of an alley for the 55 feet of its length nearest the street which the alley intersects;

Section 20. 5th Volume District. In a 5th Volume district (except as provided by Section 21 of this ordinance):

(a) No building or part thereof shall be erected to a height at any street line or alley line in excess of 264 feet, provided, however, that back from the street line or alley line such building or part thereof may be erected so as not to protrude above a plane sloping up at an angle of 30 degrees with the horizontal from such street line or alley line at the height limit a distance from such street line or alley line of 32 feet measured on the slope. The height of such sloping plane shall be the ultimate height of the structure. In a Residence district or Apartment district the area provisions of Section 18, paragraph (a) shall apply;

(b) For each 1 foot that a building or portion of it is distant from the center line of any alley, such building or such portion thereof may be erected 10 feet in height, provided this regulation shall not be applied along that part of an alley for the 55 feet of its length nearest the street which the alley intersects.

Section 21. General Volume District Provisions. (a) Where all parts of a cornice of any building or structure are more than 12 feet above the grade as defined in Section 2, paragraph (1) and below a height of 120 feet in a 3rd Volume district or below 186 feet in a 4th Volume district or below 252 feet in a 5th Volume district, and where such cornice extends in whole or in part along the street frontage of a building and where the return of such cornice, if any, along an alley wall is not longer than a distance equal to the width of the alley, such cornice may project into the street a distance of 5 feet and into the alley a distance of 3 feet, but for each 1 foot above the height of 120 feet or 186 feet or 252 feet in the 3rd or 4th or 5th Volume districts respectively, the projection of the cornice shall be reduced 3 per cent of the prescribed 5 feet or 3 feet until a projection of 2 feet shall have been reached. Above the height of a parapet as provided for by paragraph (b) of this section, no part of a structure shall project into a street or alley a greater distance than 2 feet.

(b) Nothing in this ordinance shall prevent the erection above the street line height limit of such structural members as are required to support the roof, or a parapet wall or cornice solely for ornament and without windows, extending above such height limit not more than 5 per cent of such height, but such parapet wall or cornice may in any case be at least 5½ feet high but shall not be

higher than 8 feet above such height limit.

(c) Nothing in this ordinance shall prevent the erection in a Manufacturing or Commercial district, above the height and in excess of the volume as provided by this ordinance of grain elevators, conveyors, derricks, gas holders, or other necessary appurtenances to manufacturing or storage operations in connection therewith.

(d) In a 1st or 2nd Volume district which is also in a Commercial or Manufacturing district, or in a 3rd, 4th or 5th Volume district; if the area of a building is reduced so that above the street line height limit it covers in the aggregate not more than 25 per cent of the area of the premises, the building above such height shall be excepted from the volume and street line height limit regulations. The aggregate volume in cubic feet of all such portions of the building shall not exceed one-sixth of the volume of the building as permitted by this ordinance on the premises upon which such portions are erected; provided that for each 1 per cent of the width of the lot on the street line that the street wall above the street line height limit is greater in length than 50 per cent of the width of the lot, such wall shall be erected not nearer to such street line than 1 foot; and further provided that for each 10 feet in height that any such portion of the building is erected above the street line height limit, such portion of the building shall be set back 1 foot from all lines of adjacent premises. For purposes of this paragraph, the permitted volume of a building in the 5th Volume district shall be the cubic contents of the space which may be occupied under the provisions of Section 20 of this ordinance.

(e) The street line height limit in a 2nd, 3rd, or 4th Volume district shall be increased 33-1/3 per cent of such height limit on that frontage of premises which abuts on a street greater in width than 120 feet, or on that frontage of premises directly across the street from a public park, public playground, public waterway, or cemetery, or railroad right of way other than a street railway. The same increase in the street line height limit shall apply to the frontage on a street which intersects or intercepts such street or park or playground or waterway or cemetery or railroad right of way for a distance from such street or park or playground or waterway or cemetery or railroad right of way equal to the depth of the lot under one ownership at the time of the passage of this ordinance but not beyond the boundary of the volume district which that part of the frontage of the lot is in (1) which abuts on a street greater in width than 120 feet, or (2) which is directly across the street from such park, playground, waterway, cemetery, or right of way, in any case. But the provisions of this paragraph shall not be so construed as to increase the ultimate height limit or the volume limit as provided by this ordinance.

Section 21, Paragraph E, Sub-Paragraph 1. The street line height limit in a Fifth Volume District shall be increased 66 2/3% of such height limit on all frontages of premises three (3) sides of which adjoins streets, one of which sides abuts a street greater in width than 100 feet, and one of which sides is across the street from a public park, public playground, public waterway, or cemetery, it being the intention of the provisions of this paragraph to increase the ultimate height limit of said described premises.

Passed June 14, 1929, p. 557 C. P.

Repealed Oct. 17, 1929.

(f) In a 3rd, 4th or 5th Volume district which is also in an Apartment district, the entire ground area of the lot up to an ultimate height of 30 feet may be occupied, provided such space shall be used only as a waiting room, lobby, or lounging room or auditorium or service rooms, auxiliary to an R2 or A use, and further provided that the volume as permitted by this ordinance shall



Mount Vernon Elementary School, 105th and Morgan Sts., Chicago.

John C. Christensen, Architect.

A. & E. ANDERSON COMPANY

Building Contractors

228 N. LA SALLE STREET - CHICAGO

Phone CENTRAL 5207

not be increased and further provided that the provisions of Section 22 shall take precedence over all provisions of this paragraph.

(g) Nothing in this ordinance shall prevent the erection above the street line height limit, of spires in connection with an R2 use.

(h) Where premises in one volume district are directly across an alley from a less restricted volume district, all the regulations prescribed by this ordinance pertaining to the distance of a building or part thereof from the center line of an alley for that less restricted district shall be applied to such premises.

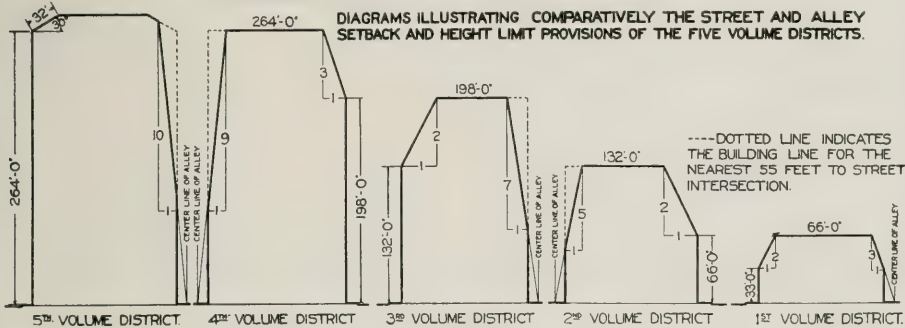
(i) Where premises or any portion thereof abut on an alley which also adjoins a

(j) A fire escape as required by other ordinances of the City of Chicago, fire-proof outside stairway or solid floor balcony to a fire tower if projected not more than 4 feet into a court or yard, the ordinary projections of window sills, belt courses, if such projections do not exceed 6 inches, shall not be deemed to reduce the area or volume of open spaces. Cornices or similar ornamental features projecting not over 4 feet into courts, which open on a street or alley shall not be deemed to reduce the area or volume of open spaces for the purpose of determining the volume of a building.

(k) Where a lot greater in area than 8,000 square feet, located in a Residence or Apart-

THESE DIAGRAMS ARE NOT PART OF THE CHICAGO ZONING ORDINANCE

DIAGRAMS ILLUSTRATING COMPARATIVELY THE STREET AND ALLEY SETBACK AND HEIGHT LIMIT PROVISIONS OF THE FIVE VOLUME DISTRICTS.



railroad right of way, public park, playground or cemetery, or which abut on the end of what is commonly known as a blind alley, the provisions pertaining to distance of a building or part thereof from the center line of an alley shall not apply for such premises or such portion thereof.

ment district abuts on two intersecting streets at their intersection, the area and volume of the building as permitted by this ordinance may be distributed over the lot.

(l) The provisions of Section 22 shall take precedence over the area provisions of all Volume district sections of this ordinance.

Volume Districts	Use Districts	Lot	Occupancy of lot in per cent of lot area	Volume of building, area of lot times	1 ft. setback from side lot lines for each 3 ft. above	Height limit at street line in feet	1 ft. setback from street line above height limit for added height of	1 ft. setback from center line of alley at grade for height of	Ultimate height of building in feet	No building nearer the center line of alley than
1st	Res. or Apt. Res. or Apt. Com. or Mfg.	Interior Corner	50 65 100	10 (D) 13 (D) 36 (D)	30 ft. (G)	33 (F)	2 ft.	3 ft.	66 (K)	8 ft.
2nd	Res. or Apt. Res. or Apt. Com. or Mfg.	Interior Corner	60 (B) 75 (B) 100	40 50 73	44 ft. (G) None	66 (F)	2 ft.	5 ft. (L)	132 (K)	8 ft. (M)
3rd	Res. or Apt. Res. or Apt. Com. or Mfg.	Interior Corner	75 90 100	100 120 144	None	132 (F)	2 ft.	7 ft. (L)	198 (K)	8 ft. (M)
4th			100	216	None	198 (F)	3 ft.	9 ft. (L)	264 (K)	
5th			100	No Volume Provision	None	264	(H)	10 ft. (L)	(H) (K)	

NOTES.

(Not a part of the ordinance.)

A—Corner lot maximum area 8,000 square feet.

B—1% (maximum 5%) may be added to the 60% or 75% of the area in a 2nd Volume Residence or Apartment district for each 100 square feet that the lot is less in area than 3,600 square feet.

C—Private or community garage 1 story not included in area or volume limits in 1st, 2nd or 3rd Volume Residence or Apartment districts.

D—Volume of a building includes courts not open to a street or alley; in a 1st Volume district space under a pitched roof (equal in volume to a 60 degree hip roof) may be erected in addition to Volume; 2/10 foot (maximum 2 feet) may be added to Volume factors of 10 feet and 13 feet in a 1st Volume Residence or Apartment district for each 100 square feet that the lot is in area than 3,600 square feet.

E—Height limit at street line is to under side of ceiling beams; parapet (maximum height 8 feet) may be added.

HANSON BROTHERS CO.

General Contractors

ESTABLISHED 1890

127 NORTH DEARBORN STREET

Chicago

TELEPHONE CENTRAL 6824

F—Street line height limit may be relaxed where frontage is on a public space.

G—Side lot line set back height limit is to the mean level of the top of fire wall; at a district boundary the least restrictive rule applies.

H—In a 5th Volume district the slope up from the street and alley lines above 264 feet is 30 degrees, for a distance of 32 feet up the slope.

I—Cornices with 5 feet projection are permitted (3 feet projection in an alley back from the street a distance equal to the width of the alley) to a height 20 feet below the height limit of the parapet; for each 1 foot above that height the cornices are reduced in projection 3%.

J—Grain elevators, derricks, gas tanks, etc., are allowed above height limit in a 1st, 2nd or 3rd Volume manufacturing use.

K—Towers in 1st and 2nd Volume commercial or manufacturing districts and in 3rd, 4th or 5th Volume districts. (See paragraph (d) Section 21.)

L—Alley set back in a 2nd, 3rd, 4th or 5th Volume district does not apply for nearest 55 feet to the street which the alley intersects.

M—Distance of buildings from center line of alleys in a 2nd or 3rd Volume district does not apply for nearest 55 feet to the street which the alley intersects.

Section 22. Building Lines. (a) For the purpose of preventing the obstruction to light and air for adjoining premises in Residence and Apartment districts by establishing building lines along the street frontage, no building shall be erected or altered in a Residence or Apartment district which is also in a 1st, 2nd or 3rd volume district or as provided by paragraph (e) of this section in a Commercial district, except in such a manner as to conform to the provisions of this section.

(b) In a Residence district no building shall be erected whose street wall is nearer the front street line than a distance equal to 15 per cent of the average depth of the lots in a block except as hereinafter provided. In an Apartment district no building shall be erected whose street wall is nearer to the front street line than a distance equal to 10 per cent of the average depth of the lots in a block except as hereinafter provided.

(c) Where a block is occupied or partially occupied by buildings which existed in the block at the time of the passage of this ordinance, the average of the distances from the street line of the front street walls of buildings shall be the established building line; but where this average distance does not exceed 10 feet in a block in which the street wall of any existing building is nearer along the front line to the street than 5 feet the street wall may be erected at the street line. Lots occupied by buildings designed for residence uses permitted in a Residence district, unless the aggregate frontage of such lots exceeds 50 per cent of the total frontage in the block, shall be considered as though vacant where located in an Apartment district for the purpose of establishing the building line.

(d) For the purpose of computing the average of the distances of street walls of buildings from the street line, the street wall nearest the street shall be considered as though it were continuous across the entire lot frontage and such average shall be based upon units of lot frontage, but buildings whose street walls are distant from the street line in excess of the provisions of paragraph (b) of this section shall be deemed to exactly conform to the provisions of paragraph (b), and existing auxiliary buildings, temporary buildings, fences, advertising signs, retaining walls, steps, balustrades, or similar existing structures shall not be considered in computing such average.

(e) Along the side of a corner lot in a Residence district or Apartment district which is not known as the front line and which generally is the side having the greatest dimension along a street line and which side line is in the same block with a lot or lots whose street line is the front line, no building shall be erected whose street wall is nearer the street at the rear end of such line than the established building line in the block and for each 1 foot that the building or part thereof is distant from the adjoining lot line exclusive of the width of an intervening alley, if any, such building or such part thereof may be erected 1 foot nearer to the street line. The provisions of this paragraph shall apply to a Commercial dis-

trict which is also in a 1st or 2nd Volume district and which is in the same block with a Residence district or Apartment district.

(f) Where a lot adjoins premises, the street wall line of which is unrestricted or less restricted by this section, the street wall line of such lot for that 75 per cent of the lot frontage nearest to such unrestricted or less restricted street wall line but not in excess of 30 feet in any case, may conform to the provisions of this section as they apply to such unrestricted or less restricted street wall which it adjoins.

(g) Where any existing building erected prior to the time of the passage of this ordinance has its street wall nearer to the street line than the building line as established by this section, then the street wall of any building erected or altered on that 75 per cent of the frontage not in excess of 30 feet of the adjacent lot which immediately adjoins the lot occupied by such existing building may approach not nearer the street line than the street wall of such existing building.

(h) Cornices, belt courses, an entrance canopy or similar roofed space having not more than 20 square feet of horizontal area covered by roof for each 25 feet of lot frontage, porches or bays projecting not more than 3 feet 6 inches exclusive of cornice and having an aggregate volume at any story not in excess of 35 per cent of the area of that part of the street wall of a building at such story multiplied by 3½ feet, and steps and landings below the level of the first floor, and their balustrades and open fences or railings or similar structures hereafter erected, provided such fences or railings or structures do not obstruct vision to an extent in excess of 40 per cent above a height of 4 feet 6 inches above the established grade, shall be exempt from the restrictions provided by this section.

(i) The premises of each building, with its usual auxiliary buildings, existing at the time of the passage of this ordinance, or premises or part thereof which may hereafter be occupied by buildings, or additions to existing buildings, shall be deemed a lot for the purposes of this section. Lots separated by an alley shall be deemed to be adjoining. All measured distances shall be to the nearest integral foot. If the fraction is ¾ foot or less the integral foot next below shall be taken.

Section 23. District Boundaries. (a) Whenever a portion of any district is indicated upon the use or volume district map as a strip paralleling an opened or unopened street, the width of this strip, unless delimited on the map by dimensions, lot lines, alleys, railroad or elevated railway rights of way, or otherwise, shall be assumed to be 125 feet measured at right angles from the nearest street line of the street to which it is parallel and adjacent.

(b) The district boundaries are, unless otherwise indicated, either street lines or lines drawn parallel to and 125 feet back from one or more of the street lines bounding a block. Where two or more district designations are shown within a block 250 feet or less in width the boundary of the less restricted district shall be deemed 125 feet



Wacker Drive, Chicago, Ill.

Herlihy Mid-Continent Company

228 No. La Salle Street



BUILDERS OF WACKER DRIVE, CHICAGO



Caisson and Foundation Work
A Specialty

F. J. HERLIHY, PRESIDENT & TREASURER

Phone Central 2905

back from its street line. Where two or more district designations are shown within a block more than 250 feet in width the boundary of the more restricted district shall be deemed 125 feet back from its street line.

(c) Where the street layout actually on the ground varies from the street layout as shown on the use or volume district map, the designation shown on the mapped street shall be applied to the unmapped streets in such a way as to carry out the manifest intent and purpose of the plan for the particular section in question.

(d) Where a district boundary line as defined in this section or as shown on the use or volume district map divides a lot in single ownership at the time of the passage of this ordinance, the use or volume authorized on the least restricted portion of such lot shall be construed as extending to the entire lot, provided this does not extend more than 25 feet beyond the said boundary line of the district in which such use is authorized. The use or volume so extended shall be deemed to be conforming.

(e) The space above the surface of streets, alleys or waterways are to be regarded merely as explanatory of the maps and shall not be deemed to be a part of the use district to which it is adjacent.

(f) Submerged lands which may hereafter be reclaimed, unless otherwise indicated on the use or volume district maps, shall be deemed to be in the same use and volume district as premises not now submerged to which such submerged lands are contiguous.

(g) Areas on the use and volume district maps along the margin of such maps outside of the border line streets are to be regarded merely as explanatory of the maps and shall not be considered as indicating the use or volume indicated thereon.

Section 24. Completion and Restoration of Existing Buildings. Nothing herein contained shall require any change in the plans, construction or intended use of a building for which a building permit has been heretofore issued and the construction of which shall have been diligently prosecuted within one year of the date of such permit, and the ground story of which, including the second tier of beams shall have been completed within such year, and which entire building shall be completed according to such plans as filed within three years from the date of the passage of this ordinance; provided the time shall be extended for not to exceed one year, or in cases where one such extension may have been granted the time shall be further extended for one year within which such ground story framework, including the second tier of beams shall be completed in any case where actual construction or fabrication was begun early enough to allow, under the then existing conditions, adequate time for completion as above specified and where such construction or fabrication was diligently prosecuted and where such completion has been prevented by conditions impossible to foresee and beyond the control of the owner or builder. Nothing in this ordinance shall prevent the restoration of a building or an advertising sign destroyed by fire, explosion, act of God or act of the public enemy, not in excess of 50 per cent of the value of the building, or prevent the continuance of the use of such building or part thereof as such use existed at the time of such destruction of such building or part thereof or prevent a change of such existing use under the limitations as hereinbefore provided.

Section 25. Administration. This ordinance shall be enforced by the Commissioner of Buildings. The Commissioner of Buildings is hereby empowered and it shall be his duty to administer this ordinance in conjunction with the administration of such portions of the general ordinances of the City of Chicago as are commonly designated as the building code of the City of Chicago in such a manner as to facilitate their joint administration. For the purpose of enforcing this ordinance the authority vested in him under the said

building code is hereby declared to be vested in him under this ordinance.

Section 26. Certificates of Occupancy. (a) It shall be unlawful to use or permit the use of any building or premises or part thereof, hereafter created, erected, changed or converted wholly or partly in its use or structure, until a certificate of occupancy, to the effect that the building or premises or the part thereof so created, erected, changed or converted, and the proposed use thereof, conform to the provisions of this ordinance, shall have been issued by the Commissioner of Buildings. No change or extension of use and no alterations shall be made in a non-conforming use or premises without a certificate of occupancy having first been issued by the Commissioner of Buildings that such change, extension or alteration is in conformity with the provisions of this ordinance.

(b) Certificates of occupancy shall be applied for at the same time that the building permit is applied for and shall be issued within 10 days after the erection or alteration of the building shall have been completed. A record of all certificates shall be kept on file in the office of the Commissioner of Buildings and copies shall be furnished upon request to any persons having a proprietary or tenancy interest in the building affected.

(c) Pending the issuance of a regular certificate, a temporary certificate of occupancy may be issued for a period not exceeding six months, during the completion of alterations or during partial occupancy of a building pending its completion. Such temporary certificates shall not be construed as in any way altering the respective rights, duties or obligations of the owners or of the city relating to the use or occupation of the premises or any other matter covered by this ordinance, and such temporary certificate shall not be issued except under such restrictions and provisions as will adequately insure the safety of the occupants. No temporary certificate shall be issued if prior to its completion the building fails to conform to the provisions of the building code or of this ordinance to such a degree as to render it unsafe for the occupancy proposed.

Section 27. Plats. Each application for a building permit shall be accompanied by a plat in duplicate, drawn to scale and in such form as may be prescribed by the Commissioner of Buildings, showing the actual dimensions of the lot to be built upon, the size of the building to be erected, and such other information as may be necessary to provide for the enforcement of the regulations contained in this ordinance. A careful record of such applications and plats shall be kept in the office of the Commissioner of Buildings.

Section 28. Board of Appeals. A board of appeals is hereby established. The members of the board of appeals shall be appointed by the Mayor, subject to confirmation of the City Council. The board of appeals shall consist of five members. One of said members shall be an architect who has had 10 years' experience in the practice of his profession, one shall be a structural engineer who has had 10 years' experience in the practice of his profession, another shall have had 10 years' experience as a builder, and still another shall have had 10 years' experience as a real estate dealer. The chairman shall be designated by the Mayor. The board of appeals shall keep minutes of its proceedings showing the vote of each member on every question, or if absent or failing to vote indicating such fact. The board of appeals in its rules shall fix the time for regular meetings of the board. Special meetings may be called by the chairman or at the request of two members, provided that notice of the same shall be mailed to each member at least 24 hours before the time set, except that the announcement of a special meeting at any meeting at which all members are present shall be sufficient notice of such meeting. All meetings shall be open to the public. A quorum of the

Phones: MONroe 3232

Lumber Yard: AUStin 0300

W. J. NEWMAN CO.

Contractors



**Wrecking, Excavating and
Caisson Work**



21 NORTH CURTIS STREET
Chicago

board of appeals shall consist of three members. A majority of the members present at each meeting shall control its official actions. The members of the board shall attend meetings in person.

Note—By an amendment to the Enabling Act August 8, 1924, (Smith-Hurd, Illinois Revised Statutes, 1923, Chapter 24, Zoning) enacted since the passage of the zoning ordinance, the Board of Appeals is given power to grant variations without action by the City Council. The same amendment provides also that Council may pass amendments to the zoning ordinance without the approval of the Board of Appeals.

The provisions of the revised statute take precedent over Section 29 of the Zoning Ordinance where there is conflict.

Section 29. Functions of the Board of Appeals. (a) The board of appeals shall adopt from time to time such rules and regulations as it may deem necessary to interpret and to carry into effect the provisions of this ordinance, and shall recommend to the City Council such ordinances or amendments as it may deem necessary or desirable to carry into effect the provisions of this ordinance or to modify the same. Variations from or amendments to this ordinance shall in all cases be made by ordinance. The regulations imposed and the districts created under this ordinance may be varied or amended from time to time by ordinance, but no such variations or amendments shall be made without a hearing before the board of appeals, at which persons interested shall be afforded an opportunity to be heard. Notice of such hearing shall be published at least 15 days in advance thereof in a newspaper of general circulation in Chicago. Such notice shall state the time and place of the hearing and the place where copies of the proposed varying or amending ordinance will be accessible for examination by interested parties. Such hearing may be adjourned from time to time. Within 30 days in cases of amendments and five days in cases of variations after the final adjournment of such hearing the board of appeals shall make a final report and submit a proposed ordinance to the City Council. The City Council may enact the ordinance with or without change or may refer it back to the board of appeals for further consideration. Any proposed variation or amendment which fails to receive the approval of the board of appeals shall not be passed, except by the favorable vote of two-thirds of all the members of the City Council.

(b) **Amendments.** In case of written protest against any proposed amendment signed and acknowledged by the owners of 20 per cent of the frontage proposed to be altered, or by the owners of 20 per cent of the frontage immediately adjoining or across an alley therefrom, or by the owners of 20 per cent of the frontage directly opposite the frontage proposed to be altered as to such regulations or district, filed with the said board of appeals or with the City Council, such amendment shall not be passed, except by the favorable vote of two-thirds of all the members of the City Council. If any area is hereafter transferred to another district by a change in district boundaries by an amendment, as above provided, the provisions of this ordinance in regard to buildings or premises existing at the time of the passage of this ordinance shall apply to buildings or premises existing at the time of passage of such amendment in such transferred area.

(c) **Variations.** Upon application such board of appeals shall have power to review the action of the enforcing officer of the City of Chicago in order to determine whether it is in accordance with the terms of this ordinance. Where in specific cases of applications for permits there are practical difficulties or particular hardship in the way of carrying out the strict letter of the provisions of this ordinance the board of appeals shall have power upon application to recommend variations of or from the original or

dinance or amendments thereto.

(d) Variations in specific cases of practical difficulties or particular hardship shall include the following, but the enumeration of such cases shall not be deemed to prevent the recommendation of other proper variations:

(1) Granting of permission to devote premises in a Residence or Apartment district to a nonconforming A use or C use, except a billboard, in a block, or in a block directly across a street from a block, in which there exists a non-conforming A use or C use respectively of a similar nature, provided that such permission shall not be so exercised as to permit either such use of premises in blocks where no such use existed at the time of the passage of this ordinance on either side of the street, and further provided that a non-conforming use herein permitted shall not exceed in area of premises or cubical contents of structures of the similar non-conforming use then existing. In granting such permission the building line regulation provided by this ordinance for the block shall be maintained, and the use permitted shall be deemed to be non-conforming in the same sense as though it were erected prior to the time of the passage of this ordinance.

(2) The extension of a non-conforming use or building upon the lot occupied by such use or building at the time of the passage of this ordinance. The erection of an additional building upon a lot occupied at the time of the passage of this ordinance by a business or industrial establishment in case such additional building is a part of such establishment, when carrying out the strict letter of the provisions would result in practical difficulties or extreme and unnecessary hardship.

(3) In undeveloped sections of the city the issuance of temporary and conditional permits for not more than two years for structures and uses in contravention of the use regulations controlling Residence districts; provided such cases are important to the development of such undeveloped sections and also provided such uses are not prejudicial to the adjoining and neighboring sections already developed.

(4) In a Residence district the location of an R2 use contrary to the provisions of Section 5, provided the R2 use will not injure neighboring property for dwelling house purposes.

(5) In a 1st, 2nd or 3rd Volume district, the moderate relaxation of the area or volume provisions of Section 16, 17 or 18 for the erection of a building for an R2 or A3 use where the premises to be devoted to such use were acquired prior to the time of the passage of this ordinance.

(6) Variation in the application of Section 10 or Section 14 in a Commercial district or part thereof in blocks adjoining the city limits of Chicago or on premises across the street from blocks in which the limitations provided by Section 10 do not apply or in neighborhoods where uses existing at the time of the passage of this ordinance are contrary to the provisions of such section or where by reason of amendment to the ordinance the said district or part thereof comes to be within 125 feet of a Residence or Apartment district, taking into consideration the conditions then existing in the blocks affected by the amendment.

(7) Variation in the application of Section 12 or Section 14 in a Manufacturing district or part thereof in locations where uses existing at the time of the passage of this ordinance are contrary to the provisions of such sections or when by reason of amendment to this ordinance any part of the then existing M2 or M3 uses in such district or part thereof come to be nearer to a Residence or Apartment or Commercial district than permitted by Section 12.

(8) Permission to maintain an M2 or M3 use anywhere in a Manufacturing district which otherwise would not be permitted by this ordinance where clearly the appropriate



Tribune Tower



Wrigley Building

L. P. FRIESTEDT CO.

BUILDING RAISING MOVING AND SHORING ENGINEERS



Contracts Taken
Anywhere in the
United States.

Work Guaranteed

Tel. Randolph 0296-0297



Union League Club



Masonic Temple

General Offices: 1638, 7 S. Dearborn St., Chicago, Ill.



Stevens Hotel



Palmer House

use of neighboring property is not injured thereby.

(9) Variation of the area or volume provisions of this ordinance in a block where there exists a structure which exceeds the area or volume requirements respectively of this ordinance, provided, however, that such variation shall not be construed to permit the erection of a structure in excess of the area or volume of such existing structure.

(10) In a Residence or Apartment district where lots are irregular in shape or where obviously no building line is required by reason of the peculiar conditions, or where all light is obtained from public spaces, variation of the area requirements of this ordinance and in such cases a proportionate variation in volume.

(11) Variation in the definition of the height of building where a building is erected with a frontage on a public waterway or on a natural hillside, but such variation shall be made only for the purpose of adjusting the height limits so as to conform with that of neighboring structures.

(12) Variation in the height of buildings regulations for the purpose of permitting the erection of additional stories to an existing building where it can be shown that the erection of such additional stories was contemplated, and where the original foundations were designed to carry such additional stories.

(13) Granting of permission in an Apartment district which is also in a 2nd, 3rd, 4th or 5th volume district to occupy space on the lot in addition to the area or volume permitted by Sections 17, 18, 19 or 20, of this ordinance, provided such additional space shall occupy lower floors only and further provided that such additional space shall be used only as a waiting room, lobby or lounging room or auditorium or service rooms auxiliary to an R2 or A use. In granting such permission the building line regulations provided by this ordinance for the block shall be maintained, but the volume permitted by this ordinance may be correspondingly increased.

(14) Alteration or relaxation of the provisions of Section 22, or to the extent necessary to prevent undue or peculiar hardship where in any block or portion of a block there are lots not of uniform depths, or irregular shapes or peculiar proportions, forms or topography, or fronting on more than one street, or where any frontage less in length than 100 feet has adjoining it on each side permanently less restricted frontage, or when clearly the general purpose and intent thereof will be better served thereby.

(15) Where owners of all properties in a block petition in writing for the establishment of a building line within that block, which building line is less restrictive than that which would otherwise be established by the provisions of Section 22, the alteration of the building line proposed by the petitioners.

(16) In a Residence or Apartment district the location of a special use as defined by Section 13 or the extension of an existing special use provided such location or such extension will not seriously injure the appropriate use of neighboring property, and further provided that the location of an air-drome shall be consistent with regulations, ordinances and laws then existing to control navigation of the air.

(17) Where a district boundary line divides a lot in single ownership at the time of the passage of this ordinance, the extension of the use or volume authorized on the least restricted portion of such lot over the entire lot, provided this does not extend more than 100 feet beyond the boundary line of the district in which the use is authorized.

Section 30. Violations and Penalties. For any and every violation of the provisions of this ordinance, the owner, general agent or contractor of a building or premises where such violation has been committed or shall

exist, and the lessee or tenant of an entire building or entire premises where such violation has been committed or shall exist, and the owner, general agent, contractor, lessee or tenant of any part of a building or premises in which part such violation has been committed or shall exist, and the general agent, architect, builder, contractor or any person who commits, takes part in or assists in such violation or who maintains any building or premises in which any such violations shall exist, shall for each and every violation and for each and every day or part thereof that such violation continues, be subject to a fine of not more than \$200.00. Any person violating the provisions of this ordinance by pursuing a C or M1 use which without operation of approved nuisance prevention equipment or without certain nuisance eliminating processes or methods of operation would be classified as an M2 or M3 use, or an M2 use which without such equipment, processes or methods would be classified as an M3 use, shall be deemed to have committed a separate violation of this ordinance for each day or part thereof that such C or M1 or M2 use is operated in such a manner as to violate the manifest purpose and intent of the definition of a C or M1 or of an M2 use respectively, and each complete unit of equipment shall be deemed a separate use for the purposes of this paragraph and shall be subject to the same penalty as provided herein. Legal remedies for violations shall be had and violations shall be prosecuted in the same manner as is prescribed by law or ordinance for the prosecution of violations of other ordinances, effective in the City of Chicago.

Section 31. Remedies. In case any building or structure is erected, constructed, reconstructed, altered, repaired, converted, or maintained, or any building, structure or land is used, in violation of this ordinance or any other ordinance or lawful regulation, the proper authorities of the City of Chicago, in addition to the remedies herein provided for may institute any appropriate action or proceeding to prevent such unlawful erection construction, reconstruction, alteration, repair, conversion, maintenance or use, or to impose a penalty for such violation, or to restrain, correct or abate such violation, in order to prevent the occupancy of said building, structure or land contrary to the provisions hereof, or to prevent any illegal act, conduct, business or use in or about such premises.

Section 32. Validity of Ordinance. If any section, paragraph subdivision, clause, sentence or provision of this ordinance shall be adjudged by any court of competent jurisdiction to be invalid, such judgment shall not affect, impair, invalidate or nullify the remainder of this ordinance but the effect thereof shall be confined to the section, paragraph, subdivision, clause, sentence or provision immediately involved in the controversy in which such judgment or decree shall be rendered.

Section 33. Effect on Present Ordinances. This ordinance shall not be construed as repealing or modifying any valid ordinances of the City of Chicago now in effect which restrict the location of industries, entertainments, occupations, establishments or enterprises of any kind, either by requiring frontage consents from property owners or residents affected by such location, or by prohibiting or restricting the location of same within a fixed distance from a hospital, church, public school or parochial school, or the grounds thereof, or on or near any class of streets or boulevards or any parks, playgrounds or bathing beaches. As to all other ordinances or parts of ordinances in conflict with any of the provisions of this ordinance, the same are hereby repealed.

Section 34. When Effective. This ordinance shall take effect and be in force from and after its passage, approval and due publication.



"Type 79" Glassteel Diffuser

New Benjamin "Type 79" Lighting Equipment

*Reflector, Lamp and Globe
Detachable as a Complete
Unit for Easy Cleaning on
the Floor*

Easier installation—lowered maintenance costs—rugged strength and durability—these are all assured by the new Benjamin "Type 79" construction available in Benjamin Glassteel Diffusers and Benjamin RLM Dome Seamless Reflectors.

A slight upward pressure on the reflector rim—less than a quarter turn to the left and the reflector lamp and globe may be taken down as a complete unit for easy cleaning on the floor. A scheduled maintenance program may thus be carried out with a minimum of time and expense.



"Type 79" RLM Dome Reflector



Installation is unusually easy—wire leads are pulled through large center hole in hood and looped around large flat headed binding screws in hood terminal base. The bayonet heel on top of the reflector is then inserted in the base of hood and the reflector moved less than a quarter turn to the right. This single movement securely locks the two assemblies together and at the same time establishes positive electrical contact.

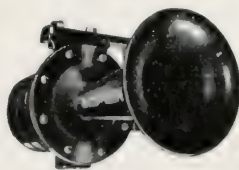
Write for bulletin giving complete information.

OTHER BENJAMIN PRODUCTS



Elliptical Angle

For side lighting of vertical or horizontal surfaces—wide lateral distribution. Porcelain Enamelled Steel Reflector with separable fitting.



Motor Driven Signal

For warning or code calling—commands instant attention in noisy locations—A.C. or D.C. types.



Projectolite

For uniformly lighting straight or rounded surfaces from a grazing angle. Vapor proof—adjustable—easily cleaned.

Write for General Catalog 24.

BENJAMIN ELECTRIC MANUFACTURING CO.

General Offices and Works: Des Plaines (Chicago Suburb), Ill.

NEW YORK

CHICAGO
111 No. Canal St.

SAN FRANCISCO

DEPARTMENT OF ELECTRICITY, CITY OF CHICAGO

IMPORTANT NOTICE.

A permit must be obtained for **all** installations or alterations of electrical equipment.

A permit must be obtained **before the work is started.**

Permits will be issued to electrical contractors only when they are registered in conformity with the ordinances of the City of Chicago.

Application for permit must give the location by street and number. Locations on corners will not be accepted. The street number **must be correct.** A person doing work at any other location than that specified in the permit is in violation of the ordinance, and the records of the department are thereby confused and the furnishing of current delayed.

Application for permits to install wires or apparatus over or under public property, such as commercial street lighting posts, festoon lighting or temporary wires, must be made on a special form. The application must be approved by the Commissioner of Public Works and the Commissioner of Gas and Electricity before the permit will be issued. The authority of a franchise granted by the City Council is required for the installation and maintenance of wires over or under public property such as wires between buildings on opposite sides of a street or alley. An annual compensation fee is specified in the ordinances covering each franchise.

Application must be signed by the Supervising Electrician.

The inspection fee must be paid before a permit is issued. As this fee is based on the apparatus installed a **correct statement** of such apparatus must appear on the application.

The permit issued on an application will authorize only work therein applied for. If other work is done it must be covered by additional permits.

No current shall be used on apparatus installed under authority of a permit until the issuance of a temporary or final certificate.

When an installation is ready for current a request for current must be made on the form provided for this purpose. When forms are received covering both wiring and fixtures the temporary certificate will automatically issue. The request for current must, in all cases, be signed by some representative of the registered contractor.

Requests for current must not be sent in with the application for wiring. These requests must only be sent in **after the work is completed.**

A violation of the ordinances of the City of Chicago governing the installation and alteration of electrical equipment is punishable by a fine of from \$5.00 to \$50.00.

MICHAEL J. KENNEDY,
Commissioner of Gas and Electricity.

SPECIAL SUGGESTIONS TO ARCHITECTS.

Architects are urged to make definite specifications for electrical work, for the benefit of both the electrical contractor and the fixture contractor, specifying the number of outlets in each job for the electrical contractor to follow, and the exact number of 40 watt or equivalent.

It is also suggested that the architects demand of the electrical contractor that he make up all connections and combinations relative to switches, complicated outlets, etc., leaving only two wires for the fixture hangers to make his fixture connections.

GENERAL SUGGESTIONS.

In all electric work conductors, however well insulated, should always be treated as bare, to the end that under no conditions, existing or likely to exist, can a grounding or short circuit occur, and so that all leakage from conductor to conductor, or between conductor and ground, may be reduced to the minimum.

In all wiring special attention must be paid to the mechanical execution of the

work. Careful and neat running, connecting, soldering, taping of conductors and securing and attaching of fittings, are especially conducive to security and efficiency, and will be strongly insisted on.

In laying out an installation, except for constant current systems, every reasonable effort should be made to secure distribution centers located in easily accessible places, at which points the cutouts and switches controlling the several branch circuits can be grouped for convenience and safety of operation. The load should be divided as evenly as possible among the branches and all complicated and unnecessary wiring avoided.

CERTIFICATES.

When an electrical installation has been completed in accordance with the Standards and Specifications of the Chicago Electrical Code, and when the inspection fee has been paid, a certificate is issued by the Department of Gas and Electricity certifying to these facts. Architects should ask for the delivery of this certificate before making or authorizing final payment.

THE NEW APPLETON NO-THREAD UNILETS

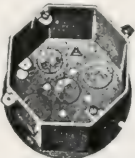
AND OTHER CONDUIT FITTINGS FOR ALL
WIRING REQUIREMENTS



Type "NTLB"
No-Thread Unilet



Type "C" Unilet
with Receptacle



Concrete Ring and
Bottom Plate



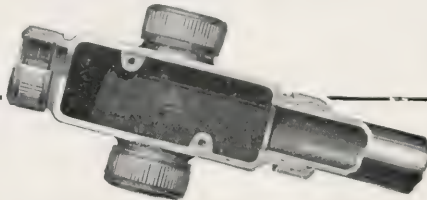
Type "AY"
Entrance Fitting



Type "FEB"
Entrance Fitting



Boltless Fixture
Stem



APPLETON NO-THREAD UNILETS have been improved and redesigned to meet the needs of present day industries where quick, yet effective and efficient wiring must be done without any loss of time. Change overs which must necessarily be made from time to time are readily accomplished because of the simplicity of construction of these fittings.

With Appleton No-Thread Unilets, you simply cut the conduit—bend it to any angle and slip into the hub of fitting. By tightening the knurled nut, the tapered contracting sleeve in the nut contracts and engages in the male thread hub of the fitting; the beadings in the sleeve cut their way into the conduit, gripping it firmly and providing a perfect ground.

Wherever a neat, quick and economical job of wiring is desired, "Unilets" are invariably preferred. This preference is due largely to their individual design and manufacture. And being adaptable to any fitting requirement, they simplify installation operations and reduce material and labor costs.

"Unilets" are light, strong, easy to handle and install; provide 50% more wiring space, low transportation charges, and eliminate breakage in handling and shipping. Made with flat bottoms they fit securely against wall or ceiling.

"Appleton" distribution is nation-wide, which assures prompt deliveries and affords standardization of these fittings for all wiring work. Catalog 9-C contains hundreds of fittings, pictorially indexed. If you haven't a copy, write for one today.

APPLETON ELECTRIC COMPANY

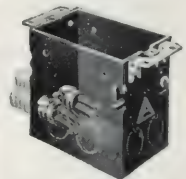
General Office and Factory
1721 Wellington Avenue
CHICAGO



Type "NTT"
No-Thread Unilet



Type "LL" Unilet
with Blank Cover



Switch Box with
Clamps for
Armored Cable



No. 532-L Box
with Clamps for
Loom, BX, etc.



Straight Box
Connector



One-Screw
Conduit Clamp

APPLETON UNILETS
and CONDUIT
STANDARD FOR
FITTINGS
BETTER WIRING

SECTIONS OF THE CHICAGO MUNICIPAL CODE OF THE CITY OF CHICAGO GOVERNING ELECTRICAL INSPECTIONS

AN ORDINANCE

Passed July 13, 1927, Amended August 24, 1927.

Providing for the registration of electrical contractors and fixing a fee therefor.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF CHICAGO:

Section 1. That Chapter XXXVI of The Chicago Municipal Code of 1922 as amended be and the same is hereby further amended by striking out Article II, containing Sections 1631 to 1641 inclusive, and by substituting the following in lieu thereof:

ARTICLE II.

Registration of Electrical Contractors.

1631. **Electrical Contractor Defined.)** The term "electrical contractor," as used in this article, shall be understood to mean any person, firm or corporation engaged in the business of installing or altering by contract electrical equipment for the utilization of electricity supplied for light, heat or power, not including radio apparatus or equipment for wireless reception of sounds and signals, and not including apparatus, conductors and other equipment installed for or by public utilities (including common carriers) which are under the jurisdiction of the Illinois Commerce Commission, for use in their operation as public utilities; but the term "electrical contractor" does not include employes employed by such contractor to do or supervise such work.

1632. **Registration.)** It shall be unlawful for any person, firm or corporation to engage in the business of electrical contractor, as herein defined, without being registered as an electrical contractor in the manner herein-after set forth; Provided, however, that if such person, firm or corporation is already registered for the current year in another city or village within the State of Illinois such electrical contractor shall not be required to be registered or to pay a registration fee in this city.

1633. **Application for Registration.)** Any person, firm or corporation desiring to engage in the business of electrical contractor shall apply for registration to the commissioner of gas and electricity. Upon the filing of such application in proper form, and the payment of the registration fee fixed herein, the commissioner of gas and electricity shall register the applicant as an electrical contractor, and shall issue to the applicant a certificate of registration which will authorize the applicant to engage in such business for the year in which it is issued. The commissioner of gas and electricity shall keep a suitable record of such registrations.

1634. **Fee for Registration—Term.)** The fee for registration as an electrical contractor shall be twenty-five dollars (\$25.00) per annum, which sum shall be paid by the appli-

cant to the City Collector in advance upon filing the application; provided, that when such application is made by an applicant, not previously registered, on or after July 1st of any year the fee for registration shall be \$12.50 for the remainder of such calendar year. The certificate of registration issued thereunder shall expire on the 31st day of December of the year in which it is issued.

1635. **Penalty.)** Any person, firm or corporation that shall engage in the business of electrical contractor without obtaining a certificate of registration as herein provided for, or that shall violate any of the provisions of this article, shall be fined not less than twenty dollars nor more than one hundred dollars for each offense, and a separate and distinct offense shall be regarded as committed every day on which such person, firm or corporation shall continue to operate contrary to the provisions of this article.

Section 2. This ordinance, including the provisions and penalty therein set forth, shall take effect and be in force from and after its passage and due publication.

AN ORDINANCE

Passed July 13, 1927.

Providing for the regulation of the installation, alteration and use of electrical equipment, and for the inspection thereof.

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF CHICAGO:

Section 1. That Chapter XXXVI of The Chicago Municipal Code of 1922, as amended, be and the same is hereby further amended by inserting, immediately before Article III of said chapter, a new article to be known as Article II-A, containing headings and sections numbered 1636 to 1641 inclusive, to read as follows:

ARTICLE II-A.

Installation, Alteration, Use and Inspection of Electrical Equipment.

1636. **Electrical Equipment Defined—Bureau Established.)** The term "electrical equipment" as used herein is hereby defined as meaning conductors and equipment installed for the utilization of electricity supplied for light, heat or power, but does not include radio apparatus or equipment for wireless reception of sounds and signals and does not include apparatus, conductors and other equipment installed for or by public utilities, including common carriers, which are under the jurisdiction of the Illinois Commerce Commission, for use in their operation as public utilities.

There is hereby established a bureau within the department of gas and electricity which shall be known as the electrical inspection bureau. Such bureau shall be the electrical inspection department of the city of Chicago authorized by the Act of the General Assem-



Electrification is part of today's building job . . .

No matter what class or type the building may be, its design and details of construction are greatly influenced by electrical requirements.

In large or small residence buildings, consideration of lighting, or of the possibility of installing electric ranges, electric refrigerators, or electric labor-saving devices, guides the choice and arrangement of outlets, switches and panelboards. In office buildings or industrial structures, elevators, ventilating and pumping equipment, and a variety of other electrical applications enter into the building plans.

Westinghouse engineers are constantly in touch with current problems throughout the entire building industry. Their specialized experience is an assurance of competent cooperation in helping you to meet individual building problems, as well as of sound engineering, in all Westinghouse equipment. Get in touch with the Westinghouse representative nearest you or write for the new Westinghouse publication, "Building in the Electrical Age."

Westinghouse equipment for buildings includes:

Circuit Breakers	Panelboards
Elevators	Ranges
Fans	Safety Switches
Fuses	Solar Glow Heaters
Insulating Materials	Switchboards
Lamps	Turbines
Lighting Fixtures	Transformers
Motors and Control for Ventilating Sys- tems, Pumps, etc.	Without Meter- Water Heaters



*The Sign of a
Westinghouse
Dealer*

Westinghouse

Complete electrification for modern buildings

**Westinghouse Electric &
Manufacturing Co.**

20 North Wacker Drive

Chicago, Ill.



bly of Illinois approved June 30, 1927, entitled "An Act in relation to the regulation of the installation, alteration and use of electrical equipment." Such bureau shall consist of the chief electrical inspector of the city and such other employees as may from time to time be provided for by the City Council. Such electrical inspection bureau shall be charged with the duty of enforcing the provisions of this ordinance, the rules and regulations of the department of gas and electricity and the standards and specifications for the installation, alteration and use of electrical equipment as herein defined and as prescribed by the electrical commission hereinafter provided for, and shall function under the immediate supervision and control of the commissioner of gas and electricity.

1637. Electrical Commission Created.—Duties.) There is hereby established a commission to be known as the Electrical Commission of the City of Chicago, which shall consist of five members. The commissioner of gas and electricity shall be a member, and ex-officio chairman, of such commission. Of the other four members, one shall be an electrical contractor, one a journeyman electrician, one a representative of an inspection bureau maintained by the fire underwriters, and one a representative of an electricity supply company, who shall be appointed by the Mayor by and with the advice and consent of the City Council. The commissioner of gas and electricity shall serve on such commission without additional compensation therefor. The other members shall receive such compensation as may be fixed by the City Council.

It shall be the duty of the said commission to formulate and recommend safe and practical standards and specifications for the installation, alteration and use of electrical equipment designed to meet the necessities and conditions that prevail in the city, to recommend reasonable rules and regulations governing the issuance of permits by the electrical inspection bureau, and to recommend reasonable fees to be paid for the inspection by the electrical inspection bureau of all electrical equipment installed or altered within the city. The standards and specifications, rules and regulations and the fees so recommended shall become effective upon the passage of an ordinance adopting same by the City Council. All such fees shall be paid to the City Collector.

1638. Permits—Applications—Certificates—Reinspections.) No electrical equipment shall be installed or altered except upon a permit first issued by the electrical inspection bureau. The electrical inspection bureau shall issue permits for such installation and alteration of electrical equipment in all cases where application for such permit shall be made in accordance with the rules and regulations applicable thereto; provided, however, that no permit shall be issued for installing or altering by contract, electrical equipment, unless the person, firm or corporation applying for such permit is registered as an electrical contractor as required by the ordinances of the city of Chicago. The electrical inspection bureau shall inspect all electrical equipment installed or altered, and shall require that it conform to the standards and specifications applicable thereto and adopted as aforesaid, and upon completion of such installation or alteration in compliance with such standards and specifications, shall immediately issue a certificate of inspection covering such installation or alteration.

The electrical inspection bureau is hereby empowered to reinspect any electrical equipment, and when said equipment is found to be unsafe to life or property shall notify the person, firm or corporation owning, using or operating same to place the same in a safe

and secure condition and in compliance with the standards and specifications described herein within such time as the electrical inspection bureau shall consider just and reasonable. Upon refusal or wilful failure to comply with the requirements of such notification, in addition to the penalties otherwise provided herein, the electrical inspection bureau may order and compel the cutting off and stopping of such current until such electrical equipment has been placed in a safe and secure condition and in compliance with the standards and specifications referred to herein. No inspection fee shall be charged for such reinspection, but in case it becomes necessary to replace such electrical equipment on account of defects disclosed by such reinspection a permit therefor shall be obtained and an inspection fee paid as provided for in Section 1637.

The electrical inspection bureau shall keep complete records of all permits issued and inspections made and other official work performed under the provisions of this ordinance.

1639. Power to Enter Buildings—Make Inspections—Call upon the Police Department.) The commissioner of gas and electricity, the chief electrical inspector and his assistants shall have the power to enter buildings or premises at any reasonable hour in the discharge of their duties, and it shall be competent for them when necessary, to remove any existing obstructions such as laths, plastering, boarding or partitions which may prevent a perfect inspection of the electrical equipment, and it shall be unlawful for any person to interfere with them in the performance of their duties. Whenever, in the opinion of the commissioner of gas and electricity, it shall be necessary to call upon the department of police for aid and assistance in carrying out or enforcing any of the provisions of the ordinances of the city of Chicago governing the inspection of electrical equipment, he shall have the authority to do so, and it shall be the duty of any member of the department of police, when called upon by said commissioner of gas and electricity, to act according to the instructions of and to perform such duties as may be required by such commissioner of gas and electricity in order to enforce or put into effect the provisions of the ordinances of the city of Chicago relating to the inspection of electrical equipment.

1640. Use of Equipment.) Whenever any electrical equipment has been installed or altered, no electrical current shall be supplied to or used on such equipment previous to the inspection of such equipment by the electrical inspection bureau and the issuance of a certificate of inspection covering such installation or alteration; provided, that the inspection bureau may issue a temporary certificate for the use of electrical current during the course of construction or alteration of buildings which temporary certificate shall expire when the construction or alteration of such building is complete.

1641. Penalties.) Any person, firm or corporation that shall install or alter any electrical equipment after the approval of the standards and specifications and the fees prescribed therefor, except such as is exempt from the provisions of this ordinance, without first having secured a permit as provided for herein, or any person, firm or corporation that shall violate or wilfully fail or refuse to comply with the provisions of this ordinance or with the rules, standards or specifications established by the Electrical Commission of the City of Chicago that have been adopted by the City Council, shall, upon conviction thereof, be fined not less than five dollars nor more than fifty dollars for each offense.

THE TRUMBULL ELECTRIC MFG. CO.



Factory 1928

Manufacturers of
SAFETY SWITCHES
PANEL BOARDS AND SWITCHBOARDS
OPEN KNIFE SWITCHES
PORCELAIN WIRING DEVICES

FACTORY AND HOME OFFICE

PLAINVILLE, CONN.

BRANCH SWITCHBOARD AND PANELBOARD FACTORY
AT LUDLOW, KENTUCKY

Sales Offices

NEW YORK
114 Liberty St.

CHICAGO
2001 W. Pershing Rd.

SAN FRANCISCO
595 Mission St.

ATLANTA

PHILADELPHIA
The Bourse Bldg.

BOSTON
1002 Statler Bldg.

Section 2. This ordinance and the penalties therein prescribed shall take effect and be in force from and after its passage and due publication.

Appointment of Members of the Electrical Commission of the City of Chicago.

OFFICE OF THE MAYOR

Chicago, August 24, 1927.

To the Honorable, the City Council of the City of Chicago:

Gentlemen: By virtue of the power and authority conferred upon me by law, I hereby appoint the following to be members of the Electrical Commission of the City of Chicago:

Michael J. Kennedy,
William McGuineas,
W. Jasper,
J. A. Neale,
Arthur P. Good,

and respectfully ask the concurrence of Your Honorable Body in said appointments.

Yours respectfully,

WM. HALE THOMPSON,
Mayor.

AN ORDINANCE

Passed August 31, 1927.

Adopting the recommendations of the Electrical Commission of the City of Chicago.

WHEREAS, The Electrical Commission of the City of Chicago has formulated safe and practical standards and specifications for the installation, alteration and use of electrical equipment designed to meet the necessities and conditions that prevail in the City of Chicago; and has recommended their adoption by the City Council; and

WHEREAS, The said Commission has prescribed reasonable rules and regulations governing the issuance of permits by the electrical inspection bureau, and has recommended their adoption by the City Council; and

WHEREAS, The said Commission has also prescribed reasonable fees to be paid for the inspection by the electrical inspection bureau of all electrical equipment installed or altered within the city, and recommends their adoption by the City Council; therefore,

BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF CHICAGO:

Section 1. That the recommendation of the Electrical Commission of the City of Chicago of the standards and specifications for installation and repair of electrical equipment as contained in the amendment to Section 1632 of The Chicago Municipal Code of 1922, passed by the City Council of the City of Chicago on July 22, 1926, and appearing on pages 4327 to 4356 of the 1926 Journal of the Proceedings of the City Council, as safe and practical standards and specifications for the installation, alteration and use of electrical equipment within the City of Chicago, be and the same are hereby adopted as the standards and specifications for the installation, alteration and use of electrical equipment in the City of Chicago. (Chicago Electrical Code of 1926.)

Section 2. That the recommendation of the Electrical Commission of the City of Chicago of the rules and regulations governing the issuance of permits by the electrical inspection bureau be and the same are hereby adopted as rules and regulations for the issuance of permits by the electrical inspection bureau, said rules and regulations being as follows:

Permits for the installation or alteration of electrical equipment shall be issued only upon receipt of an application therefor, made out on a printed form to be furnished by the Commissioner of Gas and Electricity, and

submitted to the electrical inspection bureau; and upon the payment, in advance, of the inspection fee herein provided for.

The application for permit shall contain the name of the owner or user of the equipment to be installed or altered, the location by street and number of such installation, and a detailed description of the equipment to be installed or altered.

Section 3. That the fees prescribed by the Electrical Commission of the City of Chicago to be paid for the inspection by the electrical inspection bureau of all electrical equipment installed or altered within the City of Chicago be and the same are hereby adopted as the fees for such inspection in the City of Chicago, said fees being as follows:

Wiring only for Lighting Circuits—not including fixtures, sockets or receptacles. For the inspection of each complete branch lighting circuit of 1,000 watts or less; one dollar and fifty cents for one circuit, one dollar and twenty cents for each of the next four circuits, one dollar for each of the next five circuits, eighty-five cents for each of the next five circuits, seventy-five cents for each of the next five circuits, sixty-five cents for each of the next five circuits and sixty cents for each succeeding circuit.

For the inspection of each complete branch lighting circuit of larger capacity than 1,000 watts the charge shall be in proportion to the wattage of such circuit.

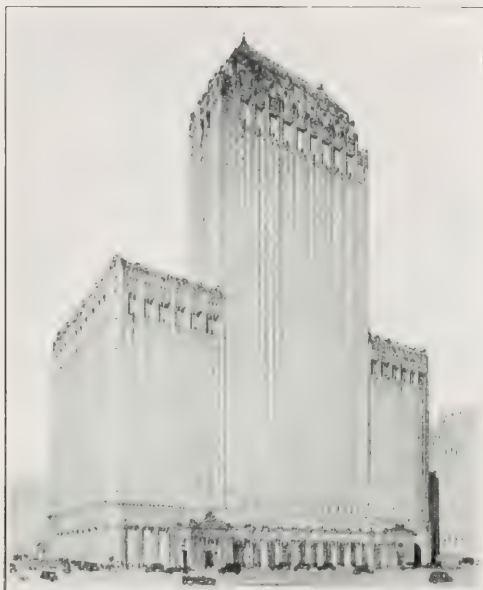
For the inspection of additional outlets on existing circuits; ten cents for each outlet on which a socket, receptacle or fixture will be attached.

Electrical Fixtures, Sockets and Receptacles—not including the circuit feeding same. For the inspection of fixtures, sockets or receptacles for lamps of nominal fifty watts capacity; one to fifteen lamps, fifty cents; sixteen to twenty lamps, seventy-five cents; twenty-one to twenty-five lamps, one dollar; twenty-six to thirty lamps, one dollar and twenty-five cents; thirty-one to forty lamps, one dollar and fifty cents; forty-one to fifty lamps, one dollar and seventy-five cents; fifty-one to sixty lamps, two dollars; sixty-one to seventy lamps, two dollars and twenty-five cents; seventy-one to eighty lamps, two dollars and fifty cents; eighty-one to ninety lamps, two dollars and seventy-five cents; ninety-one to one hundred lamps, three dollars; one hundred and one to one hundred and ten lamps, three dollars and twenty cents; one hundred and eleven to one hundred and twenty lamps, three dollars and forty cents; one hundred and twenty-one to one hundred and thirty lamps, three dollars and sixty cents; one hundred and thirty-one to one hundred and forty lamps, three dollars and eighty cents; one hundred and forty-one to one hundred and fifty lamps, four dollars; one hundred and fifty-one to one hundred and sixty lamps, four dollars and twenty cents; one hundred and sixty-one to one hundred and seventy lamps, four dollars and forty cents; one hundred and seventy-one to one hundred and eighty lamps, four dollars and sixty cents; one hundred and eighty-one to one hundred and ninety lamps, four dollars and eighty cents; one hundred and ninety-one lamps to two hundred lamps, five dollars; above two hundred lamps, five dollars for the first two hundred lamps and twenty-five cents for each group of twenty-five lamps or less. For lamps of capacity greater than fifty watts the charge shall be in proportion to the wattage of the lamp.

Wiring and Fixtures. For the inspection of both circuit wiring and fixtures, sockets or receptacles: The aggregate sum of the fees as shown above for wiring and for electrical fixtures.

Motors and Other Forms of Power. For the inspection of each electrical horse power of seven hundred and fifty-six watts used

The Chicago Civic Opera Is Wired with **PARANITE**



The Chicago Civic Opera Building
Graham, Anderson, Probst & White, Architects
U. S. A. Company Electrical Contractors

The choice of **PARANITE** for all electrical wiring in the great, new Chicago Civic Opera Building is a tribute to the **PARANITE** organization, and the consistently superior quality of its product.

Since 1890 **PARANITE** has been manufacturing rubber insulated wires and cables "better than code requires." Through its long experience, its exceptional manufacturing facilities, and its constant adherence to an ideal, **PARANITE** has achieved an enviable reputation for its product and its service, among architects, contractors and builders throughout the country.

For every job, large or small, there is a **PARANITE** Rubber Insulated Wire or Cable of the highest quality—an assurance of long-lived satisfaction and service.

IF IT'S **PARANITE** IT'S RIGHT

RUBBER INSULATED WIRE
and **CABLES**

THE INDIANA RUBBER & INSULATED WIRE CO.

Factory and General Offices: JONESBORO, INDIANA

Branch Offices

Chicago, Ill.
Indiana Rubber & Insulated Wire Co.,
140 South Dearborn St.

Kansas City, Mo.
Walter I. Ferguson & Co.,
533-35 Dwight Bldg.

Los Angeles, Cal.
H. F. Boardman,
400 Hibernian Bldg.

for mechanical or other purposes than above mentioned, one motor, \$2.00 plus 10c per horse power; additional motors 50c plus 10c per horse power. This fee to be applied to all motors over $\frac{1}{4}$ H. P.; motors of $\frac{1}{4}$ H. P. or under to be charged on an equivalent incandescent lamp basis.

Temporary Work, Outside Work, Etc. Inspections of electric lights, other than electric signs as herein defined, placed on a public street or alley for the purpose of illuminating the same, temporary installations for show window exhibitions, conventions and the like, underground or overhead wires and apparatus, and all other inspections not specifically provided for herein, shall be charged for according to the time required for such inspections at the rate of one dollar and fifty cents per hour.

Reinspections. Each reinspection of any overhead, underground or interior wires or apparatus shall be charged for according to the time required for such reinspection at the rate of one dollar and fifty cents per hour.

Extra Inspections. Where extra inspections are made on account of any of the following reasons a charge of one dollar and fifty cents shall be made for each such inspection; inaccurate or incorrect information, failure to make necessary repairs, faulty construction.

Minimum Fee. No inspection shall be made for a less amount than one dollar and fifty cents.

Section 4. This ordinance shall take effect and be in force from and after its passage and due publication.

ARTICLE III. ILLUMINATED SIGNS.

"1643. General Requirements—Definition.) It shall be unlawful for any person or corporation to erect or maintain over any sidewalk, street, avenue, alley or public way in the city, any illuminated signs, except in accordance with the ordinances of the City of Chicago.

For the purpose of this Article illuminated signs shall be declared to be signs constructed as follows: Signs, all or any part of the letters of which are made in an outline of incandescent lamps; signs with painted, flush or raised letters, lighted by an electric lamp or lamps attached thereto; signs having a border of incandescent lamps attached thereto and reflecting light thereon; and transparent glass signs whether lighted by electricity or other illuminant.

"1644. Inspection Fees.) The owner or person having charge or control of any illuminated sign authorized by this Article, which projects in whole or in part over any sidewalk, street, avenue, alley or public way in the city shall pay for the use of the city as compensation for the maintenance of same in such place, and to cover the cost of inspection, an annual fee to be computed according to the following classification and schedule:

Projecting Signs.

The fee for all signs projecting at right angles or obliquely from the building against which same are placed, whether such signs are vertical or horizontal, and not being flat signs as hereinafter described, shall be computed at the rate of fifteen cents per annum per square foot of sign surface on each illuminated side of such signs.

Flat Signs.

The fee for all signs placed against a building running parallel thereto and not projecting obliquely or at right angles therefrom containing twenty-five incandescent lamps or less shall be two dollars and fifty cents, to which shall be added nine cents for each of the next additional twenty-five lamps, eight cents for each of the next twenty-five lamps, seven cents, for each of the next twenty-five lamps, six cents, for each of the next one hundred lamps, five

cents, for each of the following one hundred lamps, and four cents for each additional lamp above three hundred. Where illumination is by other means than incandescent lamps, the fee shall be in the same proportion, as nearly as may be, based on the illuminated area of the sign.

Temporary Signs.

The fee for illuminated signs installed for temporary use for special occasions not to exceed thirty days shall be computed at one-fourth of the annual rate fixed for the particular type or style of sign, whether projecting or flat.

"1645. Application—Permit.) Any person or corporation desiring to erect and maintain an illuminated sign over any sidewalk, street, alley or public way in the city shall make application to the Commissioner of Gas and Electricity for that purpose on a printed form to be furnished therefor by the Department of Gas and Electricity, setting forth in such printed form such information as is required by said department. Such application when made shall be submitted by the Commissioner of Gas and Electricity to the Commissioner of Public Works for his approval as to the location of such sign, and when the approval of the Commissioner of Public Works shall be placed upon such application as to the location thereof the Commissioner of Gas and Electricity shall issue to such applicant, upon the payment by such applicant to the City Collector of the compensation as herein fixed, a preliminary permit in writing, authorizing such applicant to erect a sign at the location designated in such application and of the style or design described therein. Upon the completion of the work of erecting such sign under such temporary permit the applicant shall forthwith notify the Commissioner of Public Works who shall approve the condition of the same with respect to its safety and location exclusive of its lighting features, and then notify the commissioner of gas and electricity, who shall thereupon cause a further inspection of such sign to be made; and if the commissioner of gas and electricity shall find that such sign has been constructed and erected in accordance with the ordinances of the City of Chicago, he shall thereupon issue to such applicant a permit in writing authorizing such applicant to operate and maintain the sign so erected for the period of one year from the date of the issuance thereof; such permit to be issued without further cost or expense to the applicant other than the fees hereinbefore provided.

The use of electrical current or of any other illuminant, by such applicant in connection with such sign previous to the issuance of the permit last described, is prohibited and no electrical current, or other illuminant, shall be turned on, or into, such sign, previous to the issuance of such permit, except by order of the Commissioner of Gas and Electricity, for the purpose of testing the same to see whether it is constructed in accordance with, and pursuant to, the provisions of this chapter.

No alteration shall be made on any sign erected or maintained under the authority of this Article unless all the provisions hereof are fully complied with and unless a permit expressly issued for the purpose of allowing such alterations be first secured from the Commissioner of Gas and Electricity.

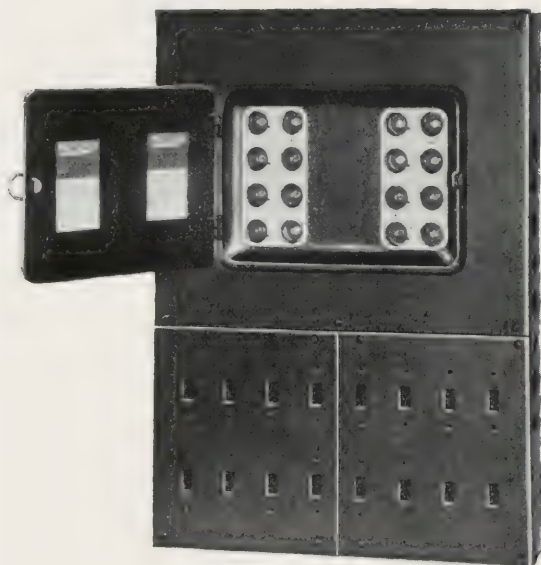
"1646. Location—time of Illumination.) Every sign erected under and pursuant to the provisions of this Article shall be placed at least nine feet above the surface of that part of the public way which any such sign overhangs, and the portion of any such sign nearest to the building against which it is placed shall not be a greater distance than two feet from such building.

No illuminated sign shall be permitted to project beyond the curb line.



Panels and Cabinets

**We Offer Unusual Quality
Exceedingly Low Priced
in These Panels and Cabinets**



Switchboards

Industrial Dead Front or Open Type.
Theatre Selective
Remote Control
& Manually Operated
Dead Front

Panelboards

Power Panels
Lighting Panels
Metering Panels

Theatre Equipment

Exit & Fire Escape Boxes
Border Light Reflectors
Proscenium Lights
Strip and Footlights
Stage Receptacles and Plugs
Receptacles and Plugs Heavy Duty
Stage Damper Magnets
Stage Floor Boxes

Steel Cabinets and Boxes

Junction Boxes
Weatherproof Boxes

*Practical for Any Electrical Installation
Flush or Surface Type with or without Switches in the Trim*

Electric Apparatus Company

Manufacturers of

Light and Power Distributing Apparatus

702-706 North Halsted Street

Telephones Monroe 5276-5277

CHICAGO

It shall be the duty of the commissioner of public works to cause the removal of any sign erected under a temporary permit unless the sign is completed in a reasonable time and a final permit issued therefor.

All sides of every such sign designed to be illuminated shall be illuminated each and every night for a no less period of time than from dusk until the hour of 9:30 p. m.

The authority granted for the erection of any such sign may be revoked at any time by order of the Mayor or of the City Council, and any inspection to permit fees paid to the city for such sign shall not be refunded in case of any such revocation.

"1647 Compliance with Rules.) Every sign erected and maintained under and pursuant to the provisions of this Article shall comply with the provisions of this Article, and be installed in a safe and secure manner.

"1648 Penalty.) Any person or corporation who shall erect or maintain an illuminated sign, or use any electric current or other illuminant in any sign in violation of any of the provisions of this Article shall be fined not less than fifty dollars, nor more than one hundred dollars for each offense, and shall be fined a further sum of ten dollars for each and every day on which he or it shall permit or cause any such sign to be erected or maintained or any electric current or other illuminant to be used therein in violation of any of the provisions of this Article; and in addition to such penalties the Commissioner of Gas and Electricity shall for any violation of any of the provisions of this Article compel the cutting off and stopping of electric current or other illuminant supplied to any such sign, and if deemed necessary or advisable by him he shall order such sign removed.

"1919. Illuminated Roof Signs.) (Permit to be obtained from Building Department. Fee for electrical inspection same as for Flat Signs, Section 1644. To be reinspected annually.)

NOTE 207. INCLOSING LIVE PARTS.

All live parts of apparatus shall be so guarded or isolated as to be accessible only to qualified persons.

All apparatus with live contacts, the operation of which can produce sparks or arcs, shall be inclosed or so located that such sparks or arcs cannot come in contact with combustible material.

These rules shall not apply to trolley wires or other exposed live parts which from the nature of their use cannot be inclosed.

It is the intent of this rule to require such protection of live parts of electrical apparatus as will eliminate, as far as possible: (1) Accidents from contact with live parts, (2) Fires which may result from sparks or flames produced in the operation of electrical apparatus.

The protection of live parts against accidental contact will be required on all apparatus where a person not familiar with the electrical apparatus may accidentally come in contact with such live parts. Such protection shall only be required where the potential of the exposed live parts exceeds 50 volts.

The protection of arcing contacts will be required on all apparatus so situated that such arcing contacts might produce fires.

Protection of live parts may be obtained by so locating apparatus that the live parts are not easily accessible. This may be accomplished by elevating the apparatus 8 feet or more above the floor; by locating the apparatus in an engine room or other location where accessible only to authorized electricians.

Protection of arcing contacts may be obtained by locating such arcing contacts in fireproof locations where there is no liability of combustible material being placed near them.

Where there are live parts which cannot be protected by location as described above, then such live parts must be provided with such inclosures as will afford the protection required above.

It is intended that the inclosure referred to will be provided in the design of the apparatus and will be supplied by the manufacturer.

The effect of the rule on various classes of apparatus, where such apparatus cannot be protected by its particular location as described above, is herewith given:

TERMINALS OF APPARATUS.

Exposed binding posts shall not be used unless all live parts of both binding post and connections to the same are so insulated that contact cannot be accidentally made with the live parts.

For portable apparatus using flexible cord connections the conductors may enter the apparatus and be connected directly to the interior conductors if provided with a means of strain relief; or a separable plug may be used with the connecting cord terminating in the separable part. Separable plugs shall be so connected that there will be no exposed live parts when the plug is disconnected.

For non-portable apparatus the design shall be such as to allow the direct entrance of conduit to the interior of the apparatus and the connection of the conductors to the interior binding posts or conductors, or a junction box may be attached to the apparatus frame and connections made within it.

For motors, or other apparatus, so installed that a small adjustment of position can be made for belt tension, or similar purpose, a short length of flexible steel conduit or of steel armored cable shall be used to allow for the adjustment, and care shall be taken that its fastenings shall be secure and permanent.

As flexible conduit is not made in sizes larger than 2½ inches, belted motors of sizes greater than 30 H. P. 110 volt, D. C., 65 H. P. 220 volt, D. C., 75 H. P. 220 volt, 3-phase, and 150 H. P. 440 volts, 3-phase, are excepted from the requirements of this rule. Where conduit is not carried direct into motor terminal fittings the conduit should be terminated as close to the motor terminals as conditions will permit and should be equipped with a standard outlet fitting. The wires should be separated and run direct to motor terminals or lead-in wires and, where there is a liability of these wires coming in contact with each other or with grounded material, they should be protected with flexible tubing.

MOTORS.

Commutators shall be protected against accidental contact. This may be accomplished by guards so designed that accidental contact cannot be made with live parts, or by a special design of the motor itself. Where protection of arcing contacts is required the commutator shall be so inclosed that sparks from the commutator cannot get outside the inclosure.

Covers: If the design of the motor does not already provide the necessary protection, then the motor shall be fitted with protecting covers in accordance with the following specifications:

Commutator or Slip Ring End of Motors: The commutator or slip rings shall be protected by hinged covers of such dimensions that when opened, all parts requiring inspection or adjustment are readily accessible. The hinges, unless they are an integral part

Wiring Devices Are Necessary in the Construction of All Types of Buildings

WHY NOT USE THE BEST?



No. 3961
Series

This new type Flush Tumbler Switch has a mechanism that is entirely enclosed by a Bakelite cup and cover.

Switch is positive in action, yet quiet and easy in operation.

appliances and so they are not likely to be left in circuit and forgotten with the risk of fire and destruction.



No. 792

This new design Duplex Convenience Receptacle of composition has a cupped face and barrier which

makes it easy and convenient to insert the cap of an attachment plug.



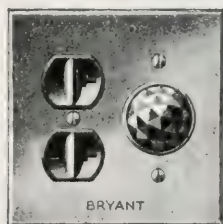
No. HS-31

This attractive Hemco Bakelite Plate retains its original color and appearance forever.



No. HV-31

This attractive Hemco Bakelite Plate retains its original color and appearance forever.



No. 763

This combination of Bull's Eye with Duplex Receptacle should be specified in those places where appliances are used. The Bull's Eye is illuminated when an attachment plug cap is inserted in either opening of the receptacle. By this arrangement it becomes evident when current is on the



No. 2979

This switch and receptacle combination provides two devices in one single gang outlet box.

Particularly adaptable for use in kitchens.

Can be wired so that the switch controls the lighting circuit with the convenience outlet always "on" or can be wired so that the switch

controls the convenience outlet only.

*Our catalog of over 4,000 Superior Wiring
Devices will gladly be mailed upon request.*

THE BRYANT ELECTRIC COMPANY

844 WEST ADAMS STREET, CHICAGO, ILL.

Telephone MONROE 0847

of the cover or motor, shall be fastened to both the cover and to the motor by rivets or screws, and if screws are used the ends shall be upset. If such parts are readily inspected or adjusted through the cover openings located in the upper half of the end bracket, the balance of the end bracket may be provided with covers permanently fastened by rivets or screws, and if screws are used the ends shall be upset.

Protection Against Contact: When necessary to provide protection against contact, the size of the openings in all cases shall not exceed $\frac{1}{2}$ square inch in area and must be of such shape as not to permit the passage of a rod larger than $\frac{1}{2}$ inch in diameter, except where the distance of live parts from the openings in the cover is more than 4 inches, the openings may be $\frac{3}{4}$ square inch in area, but shall be of such shape as not to permit the passage of a rod larger than $\frac{3}{4}$ inch in diameter.

Protection Against Fire: When necessary to provide protection against fire, the motor when installed shall have the bottom half of the end bracket without openings, or with openings covered with wire screen having a mesh of not less than 10 openings to the inch or metal covers having round holes not more than .08 inch in diameter. (This protection is not to be considered as affording a means to prevent explosions.)

Back or Pulley End of Motor: No covers or screens are required on the pulley end of the motor unless commutators, slip rings or other live unprotected parts are installed on that end, in which event the same protection shall be provided as is prescribed for the commutator or slip ring end.

This ruling applies to motors of all sizes, including the smaller types of motors used on electric fans, vacuum cleaners and the various motor-operated household and other appliances.

CONTROLLERS.

Manually operated starting boxes, speed controllers and the like shall have inclosures of such design that all live parts are completely inclosed and shall be so arranged that the device can be operated from the outside of the inclosure. This protection shall be obtained by the design of the device. The placing of a manually operated starting box inside a metal cabinet, where it is necessary to open the door of the cabinet to operate the device, is not acceptable.

Automatic starting boxes and similar electrically controlled devices shall be placed in standard cabinets provided with hinged doors.

AUTOMATIC CONTROL BOARDS.

Including automatic elevator controllers and similar devices, unless placed in fireproof locations and guarded (by screens or location) so that unauthorized persons cannot make contact with same, shall be placed in metal inclosures.

For elevators located in fireproof rooms the room shall be used only for the inclosure of the elevator machinery and the electrical control apparatus. The entire room, including floor, shall be of fireproof construction. For the fireproofing of the floor concrete, tile or sheet metal shall be used. Concrete shall be at least 3 inches thick and when placed over wood floors all openings through such floors shall have the exposed ends of boards covered by sheet metal. Sheet metal used as a floor covering shall be not less than No. 14 U. S. gage. Ceilings, if of wood, may be covered by metal lath and plaster or by transite board not less than $\frac{1}{4}$ inch thick. All doors to the room shall be kept locked.

AUTO STARTERS, COMPENSATORS, ETC.

Where there are no exposed live parts, no special protection is required. Where no voltage or overload coils having exposed contacts are used, such contacts shall be inclosed.

RESISTANCE GRIDS.

All types of resistance grids shall be protected against accidental contact either by location or by suitable ventilated inclosures. It is intended that the protective inclosure for grids shall be furnished by the manufacturers as a part of the device.

CIRCUIT-BREAKERS.

Circuit-breakers shall be inclosed in metal cabinets and, if used in place of a switch, shall be operable from the outside of the inclosure.

SPECIAL PANELBOARDS.

Such as dental boards and similar apparatus shall have live parts protected.

ELECTRIC HEATERS.

Electric heaters of all types shall have no exposed live binding posts or contacts. This does not apply to the heating element.

RECEPTACLES NEAR FLOOR.

Receptacles of the Edison base type shall not be located within four feet of the floor. See 1202 c.

KNIFE SWITCHES.

Knife switches, except on panelboards and switchboards, shall be of the safety inclosed type. See article 1202 c.

AUTOMATIC SWITCHES.

Automatic switches may be inclosed in standard cabinets with hinged doors.

EDISON PLUG CUTOUTS.

Edison plug cutouts, except those used in connection with safety switches, shall be of the dead front or safety type. See article 801 b.

STRIP FUSES.

Strip and link fuses will not be approved. All fuses shall be of the plug or cartridge type. See article 802.

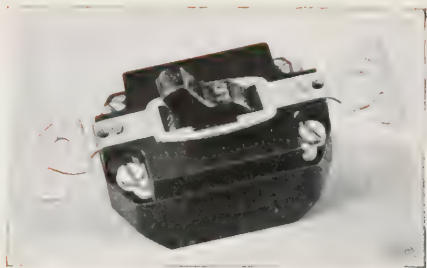
CABINETS.

Where devices are placed in metal cabinets, such cabinets shall comply with the specifications on cutout cabinets and boxes.

ENFORCEMENT OF RULES.

It is the intent of these rules to ultimately obtain from the manufacturer a class of apparatus which in its inherent design will provide the protection sought. In most cases this very desirable protection from both accident and fire can be obtained without any material increase in the cost of production. The department will, in obtaining a strict compliance with the provisions of the rule, extend every warranted concession, but it requests and expects the active co-operation of all concerned.

The rules will be enforced on all new installations and applies to all apparatus, except as noted below, whether the apparatus being installed is new or used. Where apparatus is moved from one location to another within the same building and for the same owner, or where a concern moves from one location to another, this rule shall not apply, provided the apparatus has been previously approved by the department and is in good condition. On new installations, used apparatus, other than that exempted above, shall be remodeled to comply, as far as practicable, with these rules before being again placed in use.



This new and radically different Shallow Flush Toggle Switch recently perfected by Hubbell is notable for many individual features and improvements.

HUBBELL

ALL BAKELITE ENCLOSED

Toggle Switches

*Electrically and Mechanically
Perfect in Design—"Approved"*

A RADICALLY new form of contact spring scientifically designed so that two different rates of vibration are set up in the spring; one tending to counteract the other. Thus recoil is practically eliminated in the ends of the contact spring when the solid metal contact blade strikes between them. As a result, burning and pitting of the spring is prevented—even when in circuit with type "C" lamps. An automatic "kick-off" prevents sticking of blades in contact.



Hubbell Screwless Plates of Bakelite

Ask for a description of these self-aligning switch and outlet plates. You can obtain them in any color or finish to exactly match any background.



A complete line to meet any need—

- No. 9801 Single pole, 5 amperes, 250 volts; 10 amperes, 125 volts
- No. 9802 Double pole, 10 amperes, 250 volts
- No. 9803 Three-way, 5 amperes, 250 volts; 10 amperes, 125 volts
- No. 9804 Four-way, 2 amperes, 250 volts; 5 amperes, 125 volts
- No. 9805 Single pole, 20 amperes, 250 volts
- No. 9806 Double pole, 20 amperes, 250 volts

HARVEY HUBBELL, Inc. **BRIDGEPORT, CONNECTICUT**

Boston, Mass., 176 Federal St.; Atlanta, Georgia, H. C. Biglin, 138 Marietta St.; New York, N. Y., 122 East 42nd St.; Chicago, Illinois, 318 W. Washington St.; Denver, Colo., The Sales Service Co., 1109 Broadway; Philadelphia, Pa., Fifth St., Philadelphia Bourse, (Exhibition Dept.).



ELECTRICAL INFORMATION, DEPARTMENT OF ELECTRICITY CITY OF CHICAGO

Exit Sign Lights and Emergency Lighting Systems, as Required by Ordinances of the City of Chicago.

Apartment buildings (3 stories or more in height) VI	None		
Apartment hotels (20 or more persons and more than 2 stories high) IIb	A-2-	C	
Asylums (more than 10 persons and more than 2 stories high) IIc	A-2	C	
Assembly halls IVb	A-1	E-1 and E-2	
Banquet halls IVb	A-1	E-1 and E-2	
Billiard rooms and bowling alleys IVb	A-1	E-1 and E-2	
Churches IVa	A-1	E-2	
Club houses (less than 20 persons and more than 4 stories high) IIa	A-2	B	
Club houses (20 or more persons and more than 2 stories high) IIb	A-1	C	
Dance halls IVb	A-1	E-1 and E-2	
Department stores (more than 2 stories high) VII	A-2	B*	
Dwellings III	None	None	
Expositions IVb	A-2	E-1 and E-2	
Factories (more than 2 stories high) I	A-2	B	
Garage (more than 2 stories high)	A-2	B**	
Gymnasiums (if sleeping accommodations for 20 persons or more, and more than 2 stories high) IIb	A-2	C	
Gymnasiums (in buildings containing no assembly hall) IVb	A-1	E-1 and E-2	
Gymnasiums (in buildings containing assembly halls)	None	None	
Homes for Aged or Children (more than 10 persons and more than 2 stories high) IIc	A-2	C	
Hospitals (more than 10 persons and more than 2 stories high) IIc	A-2	C	
Hotels (20 or more persons and more than 2 stories high) IIb	A-2	C	
Infirmaries (more than 10 persons and more than 2 stories high) IIc	A-2	C	
Jails (more than 10 persons and more than 2 stories high) IIc	A-2	C	
Libraries (more than 4 stories high) IIa	A-2	B	
Lodge halls IVb	A-1	E-1 and E-2	
Lodging houses (20 or more persons and more than 2 stories high) IIb	A-2	C	
Moving picture theatres —(See Theatres)			
Office buildings (more than 4 stories high) IIa	A-2	B	
Parish halls IVb	A-1	E-1 and E-2	
Police stations (more than 10 persons and more than 2 stories high) IX	A-2	B	
Residences III	None	None	
Rooming houses (20 or more persons and more than 2 stories high) IIb	A-2	C	
Skating rinks IVb	A-1	E-1 and E-2	

Schools (more than 100 students) VIII	A-2	C	
School halls (in school buildings) VIII	A-1	C	
School halls (in separate buildings) IVb	A-1	E-1 and E-2	
Stables (more than 2 stories high)	A-2	B**	
Stores (other than department stores, more than 3 stories high) I	A-2	B	
Theatres (regular theatres), V	A-1	C	
Theatres (not more than two sets of scenery and not more than 300 seats) IVb	A-1	C	
Theatres (not more than two sets of scenery and more than 300 seats) IVb	A-1	C	
Theatres (moving picture theatres with not more than 300 seats) IVc	A-1	C	
Theatres (moving picture theatres with more than 300 seats) IVc	A-1	C	
Warehouses I	None	None	

NOTE.—Any floor 6 inches below the surface level is considered as a basement.

(A-1) Emergency lighting system of electricity in all halls, corridors, stairways or other means of exit, which shall be independent of all other lights. Separate meter and service switch and, on overhead services, separate service to outside of buildings. Lights to be controlled only in lobby. Lights shall be kept burning until audience has left building.

(A-2) Emergency lighting system of electricity in all halls, corridors, stairways or other means of exit, which shall be independent of all other lights. Separate meters, and service switches, but service may be connected to mains inside of building. Lights shall be controlled only at some point near the main entrance. Lights shall be kept burning until the occupants have left the building.

(B) Exit signs illuminated by gas or electric light.

(C) Exit signs illuminated by gas only. (Electric not permitted.)

(E-1) Where auditorium is used for theatricals, whether regularly or occasionally, exit signs shall be illuminated by gas.

(E-2) Where not used for theatricals and where the seating capacity is not more than 400, exit signs shall be illuminated by gas or electricity. Where the seating capacity is more than 400, exit signs shall be illuminated by gas.

*Illuminated signs shall be provided showing the number of the floor.

**Any building more than 2 stories high having a garage or stable on the first floor, exit signs shall be illuminated by electricity; gas not permitted.

“GALVAKOTE” “ENAMELKOTE”

Super Quality

RIGID CONDUIT PIPE

installed in

Civic Opera

Daily News

Palmolive

Board of Trade

Drake Hotel Tower

Woman's Athletic Club

Buckingham

Trustees

Engineering

Medical and Dental Arts

Chicago Club

1242 North Michigan

And many other large buildings in Chicago and elsewhere



The only Rigid Conduit Pipe

MADE IN THE CITY OF CHICAGO



Distributed by

LEADING WHOLESALERS EVERYWHERE

Manufactured by

CLAYTON MARK & COMPANY

CHICAGO, U. S. A.

ALLOWABLE CARRYING CAPACITIES OF WIRES

B. & S. Gage	Diam. of Solid Wires in Mils	Area in Circular Mils	Table A Rubber Insulation Amperes	Table C Other Insulation Amperes
18	40 3	1,624	3	5
16	50 8	2,583	6	10
14	64 1	4,107	15	20
12	80 8	6,330	30	25
10	101 9	10,380	25	30
8	128 5	16,510	35	50
6	162 0	26,250	50	70
5	181 9	33,100	55	80
4	204 3	41,740	70	90
3	229 4	52,630	80	100
2	257 6	66,370	90	125
1	289 3	83,690	100	150
0	325 0	105,500	125	200
00	364 8	133,100	150	225
000	409 6	167,800	175	275
0000	460	200,000	200	300
		211,600	225	325
		250,000	250	350
		300,000	275	400
		350,000	300	450
		400,000	325	500
		500,000	400	600
		600,000	450	680
		700,000	500	760
		800,000	550	840
		900,000	600	920
		1,000,000	650	1,000
		1,100,000	690	1,080
		1,200,000	730	1,150
		1,300,000	770	1,220
		1,400,000	810	1,290
		1,500,000	850	1,360
		1,600,000	890	1,430
		1,700,000	930	1,490
		1,800,000	970	1,550
		1,900,000	1,010	1,610
		2,000,000	1,050	1,670

1 mil = 0.001 inch.

SIZE OF CONDUIT FOR THE INSTALLATION OF WIRES AND CABLES RUBBER COVERED WIRES

Size of Wire	Number of Wires in One Conduit								
	1	2	3	4	5	6	7	8	9
Minimum Size of Conduit in Inches									
14	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
12	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
8	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
6	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
5	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
4	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
3	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
2	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
1	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
0	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
00	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
0000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
200000C.M.	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
225000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
250000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
300000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
350000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
100000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
150000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
500000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
550000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
600000	1 1/2	1 1/2	1 3/4	2 1/4	2 1/2	2 3/4	3 1/4	3 1/2	3 3/4
850000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
700000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
750000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
800000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
850000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
900000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
950000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
1000000	2	2	2 1/4	3 1/4	3 1/2	3 3/4	4 1/4	4 1/2	4 3/4
1100000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1200000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1250000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1300000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1400000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1500000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1600000	2 1/2	2 1/2	2 3/4	4 1/4	4 1/2	4 3/4	5 1/4	5 1/2	5 3/4
1700000	3	3	3 1/4	4 1/2	4 3/4	5 1/4	6 1/4	6 1/2	6 3/4
1750000	3	3	3 1/4	4 1/2	4 3/4	5 1/4	6 1/4	6 1/2	6 3/4
1800000	3	3	3 1/4	4 1/2	4 3/4	5 1/4	6 1/4	6 1/2	6 3/4
1900000	3	3	3 1/4	4 1/2	4 3/4	5 1/4	6 1/4	6 1/2	6 3/4
2000000	3	3	3 1/4	4 1/2	4 3/4	5 1/4	6 1/4	6 1/2	6 3/4

* Where single conductor, single braid, solid wires only, are used, four No. 14 wires may be installed in a 1/2 inch conduit and up to seven No. 14 wires in a 3/4 inch conduit. Three No. 12 wires may be installed in a 1/2 inch conduit, four No. 10 wires in a 3/4 inch conduit and three No. 8 wires in a 3/4 inch conduit.

WIRES IN CONDUIT.—For combinations of wires not shown in the Chicago Electrical Code, the following tables may be used to determine the proper size conduit. The combined area of the wires should never exceed 40 per cent. of the area of the conduit. This table must only be used where there are more than three wires in the conduit. Special permission must be obtained for the installation of more wires than are shown in Table headed "Number of Wires in Conduit."

Support of Wires in Vertical Conduits.

Wires in vertical conduits shall be supported at the following intervals:

No. 14	to No. 0	....100 ft.
No. 00	to No. 0000	.... 80 ft.
No. 0000	to 350000 C. M.	.... 60 ft.
350001 C. M.	to 500000 C. M.	.... 50 ft.
500001 C. M.	to 750000 C. M.	.... 40 ft.
Above 750000 C. M.		.... 35 ft.

The following methods of supporting cables are recommended:

1. By approved clamping devices constructed of or employing insulating wedges inserted in the ends of the conduits.
2. By inserting junction boxes at the required intervals in which insulating supports of approved type are installed and secured in a satisfactory manner to withstand the weight of the conductors attached thereto, the boxes being provided with covers.
3. In approved junction boxes, by deflecting the cables not less than 90 degrees and carrying them horizontally to a distance not less than twice the diameter of the cable, the cables being carried on two or more insulating supports, and additionally secured thereto by the wires if desired.

Size of Ground Wire and Size of Ground Conduit for Grounding Circuit.

Size of Largest Wire	Size of Ground Wire	Size of Ground Conduit
10	10	1/2 inch
8	8	1/2 inch
6	6	1/2 inch
4	4	1/2 inch
3	3	1/2 inch
2	2	1/2 inch
1	1	1/2 inch
0	0	1/2 inch
00	0	1/2 inch
000	0	1/2 inch
0000	0	1/2 inch
300,000	4	3/4 inch
400,000	1	3/4 inch
500,000	3	3/4 inch
600,000	2	3/4 inch
700,000	1	3/4 inch
800,000 and above	0	1 inch

GUS BERTHOLD ELECTRIC CO.

—Manufacturers of—

The Berthold
Selectrolite System
— of —
Lighting Control



*Switchboards for Light and Power
Panelboards, Steel Cabinets
and Stage Equipment*



555 WEST MONROE STREET
Chicago, Ill.

Telephone: Franklin 8515-6

WHERE ALLOWED BY SPECIAL PERMISSION

Size of Wire	Maximum Number of Wires in Conduit					
	Inch 1	Inch 1 1/4	Inch 1 1/2	Inch 2	Inch 2 1/2	Inch 3
14	11	19	26	43	61	95
12		15	21	34	50	77
10		12	16	27	38	60
8			13	22	31	49
6				14	22	

SIZE OF CONDUIT FOR THE INSTALLATION OF WIRES AND CABLES

Lead Covered Wires (0-600 Volts) (Single Conductors)

Size of Wire	Outside Diam. 6 ft.	Diam. Dr. Equiv.	Number of Conductors in One Conduit			
			1	2	3	4
			Minimum Size of Conduit in Inches			
14	18	.281	1 1/2	3/4	3/4	1
12	20	.312	1 1/2	3/4	1	1 1/4
10	23	.359	1 1/2	1	1 1/4	1 1/4
8	25	.39	1 1/2	1	1 1/4	1 1/4
6	30	.47	1 1/2	1 1/4	1 1/4	1 1/2
5	32	.50	1 1/2	1 1/4	1 1/4	1 1/2
4	33	.51	1 1/2	1 1/4	1 1/4	1 1/2
3	35	.55	1 1/2	1 1/4	1 1/4	1 1/2
2	37	.58	1 1/2	1 1/4	1 1/4	1 1/2
1	41	.64	1 1/2	1 1/4	1 1/4	1 1/2
1/0	44	.68	1 1/2	1 1/4	1 1/4	1 1/2
2/0	47	.73	1 1/2	1 1/4	1 1/4	1 1/2
3/0	50	.78	1 1/2	1 1/4	1 1/4	1 1/2
4/0	54	.84	1 1/2	1 1/4	1 1/4	1 1/2
250,000	62	.97	1 1/2	1 1/4	1 1/4	1 1/2
300,000	65	1.01	1 1/2	1 1/4	1 1/4	1 1/2
350,000	68	1.06	1 1/2	1 1/4	1 1/4	1 1/2
400,000	71	1.11	1 1/2	1 1/4	1 1/4	1 1/2
450,000	74	1.15	1 1/2	1 1/4	1 1/4	1 1/2
500,000	78	1.21	1 1/2	1 1/4	1 1/4	1 1/2
550,000	86	1.34	1 1/2	1 1/4	1 1/4	1 1/2
600,000	88	1.37	1 1/2	1 1/4	1 1/4	1 1/2
650,000	90	1.40	1 1/2	1 1/4	1 1/4	1 1/2
700,000	92	1.43	1 1/2	1 1/4	1 1/4	1 1/2
750,000	94	1.47	1 1/2	1 1/4	1 1/4	1 1/2
800,000	96	1.50	1 1/2	1 1/4	1 1/4	1 1/2
850,000	99	1.55	1 1/2	1 1/4	1 1/4	1 1/2
900,000	100	1.56	1 1/2	1 1/4	1 1/4	1 1/2
950,000	102	1.59	1 1/2	1 1/4	1 1/4	1 1/2
1,000,000	105	1.64	1 1/2	1 1/4	1 1/4	1 1/2
1,250,000	116	1.81	1 1/2	1 1/4	1 1/4	1 1/2
1,500,000	126	1.97	1 1/2	1 1/4	1 1/4	1 1/2
1,750,000	136	2.12	1 1/2	1 1/4	1 1/4	1 1/2
2,000,000	142	2.21	1 1/2	1 1/4	1 1/4	1 1/2

Dimensions of Rubber-Covered Wire.

Wire	Area	Wire	Area	Wire	Area
14	.031	225,000 C.M.	.55	1,000,000 C.M.	1.74
12	.038	250,000 C.M.	.58	1,100,000 C.M.	2.04
10	.049	300,000 C.M.	.65	1,200,000 C.M.	2.16
8	.06	350,000 C.M.	.77	1,350,000 C.M.	2.22
6	.13	400,000 C.M.	.83	1,300,000 C.M.	2.27
5	.15	450,000 C.M.	.92	1,400,000 C.M.	2.40
4	.17	500,000 C.M.	.99	1,500,000 C.M.	2.52
3	.19	550,000 C.M.	1.11	1,600,000 C.M.	2.63
2	.21	600,000 C.M.	1.19	1,700,000 C.M.	2.78
1	.27	650,000 C.M.	1.27	1,750,000 C.M.	2.85
0	.31	700,000 C.M.	1.33	1,800,000 C.M.	2.89
00	.36	750,000 C.M.	1.39	1,900,000 C.M.	3.05
000	.42	800,000 C.M.	1.45	2,000,000 C.M.	3.14
0000	.49	850,000 C.M.	1.54		
		900,000 C.M.	1.60		
		950,000 C.M.	1.68		

Dimensions of Conduit.

Conduit	Area	40% of Area	Conduit	Area	40% of Area
1 1/2	306	122	3	7.34	2.93
3/4	516	206	3 1/2	9.94	3.97
1	848	339	4	12.7	5.08
1 1/4	1.49	596	4 1/2	15.9	6.36
1 1/2	2.03	812	5	19.9	7.96
2	3.32	1.328	6	28.8	11.52
2 1/2	4.75	1.9			

Example: What size conduit is required for 6 No. 6 and 4 No. 2, B. & S. gage R. C. wires? $6 \times .13 = .78$, $4 \times .21 = .84$, or a total area of 1.62. In the column headed "40% of Area" it will be found that a 2 1/2" conduit is required.

DIRECT CURRENT MOTORS—110 VOLTS SIZE OF WIRE FOR BRANCHES OR MAINS SUPPLYING ONE MOTOR ONLY.

Horse Power	Full Load Current	Size of Wire One Motor	Size of Conduit	Size of Fuse	Size of Switch
1	8	14	1 1/2	10	30
2	15	12	1 1/2	20	30
3	23	8	1 1/2	30	30
4	30	6	1 1/2	40	60
5	38	6	1 1/2	50	60
7.5	56	4	1 1/2	70	100
10	75	1	1 1/2	95	100
12.5	94	0	1 1/2	120	200
15	113	00	2	150	200
17.5	131	000	2	175	200
20	150	0000	2	200	200
		c. m.			
25	188	250	2 1/2	250	400
30	225	300	2 1/2	300	400
35	263	400	3	325	400
40	300	500	3	375	400
45	338	600	3	425	600
50	375	700	3 1/2	475	600
55	413	800	3 1/2	525	600
60	450	900	3 1/2	575	600
65	488	900	3 1/2	600	800
70	525	1000	4	650	800
75	563	1100	4	700	800
80	600	1300	4 1/2	750	800
85	638	1400	4 1/2	800	800
90	675	1500	4 1/2	850	1000
95	713	1600	5	900	1000
100	750	1700	5	950	1000
125	938	2-900	2-3 1/2	1175	1200
150	1125	2-1100	2-4	1400	1500
200	1500	2-1700	2-5	1875	1C. R.
250	1875	3-1300	2-5	2350	C. R.
300	2250	3-1700	2-5	2800	C. R.

Column headed "Size of Wire, One Motor," gives size of wire for branches and for mains supplying one motor and is based on the 25% overload required by the rules.

The question of drop is not taken into account in these tables.

Double-pole switches over 1500 amperes not permitted. Circuit-breakers or oil switches must be used.

Fuses must not be larger than 125% of motor rating.

Where fuses larger than 600 amperes are required fuses may be used in multiple. The least possible number of fuses must be used in such cases and the fuses must be of equal capacity.

VISIT THE
EVERSON EXHIBIT
BUILDING

215 N. Dearborn St.
Chicago



An Affection for the Finest



NLY an inherent affection for fine things can create and execute them. This intangible quality is the basis for our methods of procedure . . . for our selection of designers and craftsmen who are devoting their skill to those clients whose affection is for the finest.

An insight into our work and ability may be had by visiting the Everson Exhibition Building. Here a five-floor display includes, in period settings, *Lighting Fixtures, Lamps, Girandoles, Torchiers, Andirons, Fire Screens, Iron Gates, Curtain Poles, Window Grilles, Iron and Bronze Mirrors and Tables*, and distinctive objects d'art.

Original detailed sketches and estimates cheerfully furnished for apartment, residence, hotel, church, theatre and club projects.

C. G. EVERSON & CO.

Two-Fifteen North
Dearborn Street
Chicago



Telephone Central
Six Seven
Three Seven

DIRECT CURRENT MOTORS—220 VOLTS.
SIZE OF WIRE FOR BRANCHES OR
MAINS SUPPLYING ONE MOTOR ONLY.

Horse Power	Full Load Current	Size of Wire One Motor	Size of Conduit	Size of Fuse	Size of Switch
1	4	14	1½	5	30
2	8	14	1½	10	30
3	12	14	1½	15	30
4	15	12	1½	20	30
5	19	10	1½	25	30
7.5	28	8	1½	35	60
10	38	6	1	50	60
12.5	47	4	1½	60	60
15	56	4	1½	70	100
17.5	65	3	1½	80	100
20	75	1	1½	95	100
25	94	0	1½	120	200
30	113	00	2	150	200
35	131	000	2	175	200
40	150	0000	2	200	200
45	169	0000	2	225	400
50	188	c. m.	2½	250	400
55	206	300	2½	250	400
60	225	300	2½	300	400
65	244	350	2½	300	400
70	263	400	3	325	400
75	281	500	3	350	400
80	300	500	3	375	400
85	319	500	3	400	400
90	338	600	3	425	600
95	356	600	3	450	600
100	375	700	3½	475	600
125	463	900	3½	575	600
150	563	1100	4	700	800
200	750	1700	5	950	800
250	938	2-900	2-3½	1175	1200
300	1125	2-1100	2-4	1400	1500

Column headed "Size of Wire, One Motor," gives size of wire for branches and for mains supplying one motor and is based on the 25% overload required by the rules.

The question of drop is not taken into account in these tables.

Fuses must not be larger than 125% of motor rating.

Where fuses larger than 600 amperes are required, fuses may be used in multiple. The least possible number of fuses must be used in such cases and the fuses must be equal in capacity.

THREE-PHASE MOTORS—220 VOLTS.
SIZE OF WIRE FOR BRANCHES OR
MAINS SUPPLYING ONE MOTOR ONLY.

Horse Power	Full Load Current	Size of Wire One Motor	Size of Conduit	Running Fuse	Starting Fuse	Motor Switch	Service Switch
1	3	14	1½	10	10	30	30
2	6	14	1½	10	20	30	30
3	9	14	1½	15	30	30	30
5	13	12	1½	20	40	30	60
7½	19	10	1½	30	60	30	60
10	26	8	1	40	65	60	100
15	38	6	1½	50	80	60	100
20	51	4	1½	70	100	100	100
25	64	3	1½	80	125	100	200
30	77	1	1½	100	150	100	200
35	90	0	2	125	200	200	200
40	102	00	2	150	200	200	200
45	115	00	2	150	250	200	400
50	128	000	2	175	250	200	400
55	141	000	2	200	300	200	400
60	154	0000	2½	200	300	200	400
65	166	0000	2½	225	350	200	400
70	179	0000	2½	225	350	400	400
75	192	250	2½	250	400	400	400
80	205	300	3	275	425	400	600
85	218	300	3	275	450	400	600
90	230	350	3	300	475	400	600
95	243	350	3	325	500	400	600
100	256	400	3	325	500	400	600
125	320	500	3	400	650	400	800
150	384	700	3½	500	750	600	800
200	512	2-400	2-3	650	1025	800	1200
250	640	2-500	2-3	800	1300	800	1500
300	768	2-700	2-3½	1000	1550	1000	1500

Column headed "Size of Wire, One Motor," gives size of wire for branches and for mains supplying one motor and is based on the 25% overload required by the rules.

The question of drop is not taken into account in these tables.

This table is figured on a basis of 85% power factor and 90% efficiency, or 2.56 amperes per horsepower. Motors of horsepowers not shown in the table may be calculated on this basis allowing 25% overload for circuits supplying one motor.

The motor switch must not be smaller than 125% of the rating of the motor. Running fuses must not be larger than 125% of the rated current of the motor and starting fuses of a capacity of 300% of the rated current for motors of 1 to 5 horsepower, 250% for motors from 6 to 10 horsepower and 200% for motors above 10 horsepower will be permitted.

THREE-PHASE MOTORS—440 VOLTS.
SIZE OF WIRE FOR BRANCHES OR
MAINS SUPPLYING ONE MOTOR ONLY.

Horse Power	Full Load Current	Size of Wire One Motor	Size of Conduit	Running Fuse	Starting Fuse	Motor Switch	Service Switch
1	2	14	1½	5	10	30	30
2	4	14	1½	5	10	30	30
3	6	14	1½	10	15	30	30
5	9	14	1½	10	20	30	30
7½	14	12	1½	15	30	30	30
10	13	12	1½	20	35	30	60
15	19	10	1½	25	50	60	60
20	25	8	1½	35	65	60	100
25	32	6	1½	40	65	60	100
30	38	6	1½	50	75	60	100
35	45	4	1½	60	90	60	100
40	51	4	1½	65	100	100	100
45	57	4	1½	75	110	100	200
50	64	3	1½	80	125	100	200
55	70	2	1½	90	150	100	200
60	77	1	1½	95	150	100	200
65	83	0	2	100	175	100	200
70	89	0	2	110	200	200	200
75	96	0	2	125	200	200	200
80	102	00	2	125	200	200	200
85	109	00	2	150	225	200	400
90	115	00	2	150	225	200	400
95	121	000	2	150	250	200	400
100	128	000	2	175	250	200	400
125	160	000	2	200	325	200	400
150	192	250 c m	2½	250	375	400	400
200	256	400 c m	3	325	500	400	600
250	320	500 c m	3½	400	650	400	800
300	384	700 c m	3½	475	775	600	800

Column headed "Size of Wire, One Motor," gives size of wire for branches and for mains supplying one motor and is based on the 25% overload required by the rules.

The question of drop is not taken into account in these tables.

This table is figured on a basis of 85% power factor and 90% efficiency, or 1.28 amperes per horsepower. Motors of horsepowers not shown in the table may be calculated on this basis, allowing 25% overload for circuits supplying one motor.

The motor switch must not be smaller than 125% of the rating of the motor. Running fuses must not be larger than 125% of the rated current of the motor and starting fuses of a capacity of 300% of the rated current for motors of 1 to 5 horsepower, 250% for motors from 6 to 10 horsepower and 200% for motors above 10 horsepower will be permitted.



1/10 actual size

Design No. C28-375

A request made early in the construction period will permit Beardslee designers to study the architectural scheme and to create for your project lighting equipment appropriate in character and in scale. A Beardslee representative will gladly call.



BEARDSLEE
CHANDELIER MFG. CO.
 216 South Jefferson Street
 CHICAGO, ILLINOIS



Design No. N28-595

MOTORS—SIZE OF WIRES FOR MAINS.
THIS TABLE GIVES MAXIMUM HORSE-
POWER ALLOWED ON VARIOUS
SIZES OF WIRES.

Size of Wire	Size Conduit Main 2 Wire	Direct Current Maximum H. P.		Size Conduit 3 Wires	Three Phase Maximum H. P.	
		110 V.	220 V.		220 V.	440 V.
14	1½	2	4	1½	6	12
12	1½	2.7	5.3	1½	8	16
10	1½	3.3	6.7	1½	10	20
8	1½	4.7	9.3	1½	14	27
6	1	6.7	13.3	1½	20	39
4	1½	9	19	1½	27	55
3	1½	11	21	1½	31	62
2	1½	12	24	1½	35	70
1	1½	13	27	1½	39	78
0	1½	17	33	2	49	97
00	2	20	40	2	59	117
000	2	23	47	2	68	137
0000	2	30	60	2½	88	176
250,000	2½	33	67	2½	97	195
300,000	2½	37	73	3	108	216
350,000	2½	40	80	3	117	234
400,000	3	43	87	3	127	254
500,000	3	53	106	3	166	312
600,000	3	60	120	3½	176	352
700,000	3½	67	133	3½	195	390
800,000	3½	73	147	4	215	430
900,000	3½	80	160	4	234	468
1,000,000	4	87	173	4	254	508
1,100,000	4	92	184	4½	269	539
1,200,000	4½	97	195	4½	285	570
1,300,000	4½	103	205	5	301	602
1,400,000	4½	108	216	5	316	633
1,500,000	4½	113	227	5	332	664
1,600,000	5	119	237	5	348	695
1,700,000	5	124	248	5	363	727
1,800,000	5	129	259	6	378	757
1,900,000	5	135	269	6	394	789
2,000,000	5	140	280	6	410	820

In calculating the size of mains, where any individual motor has a horsepower of 50% or more of the total connected load, the 25%

overload must be allowed for such motor. Example: In a total connected load of 100 horsepower there is one 50-horsepower motor and a number of smaller motors totaling 50 horsepower; 25% overload for the 50-horsepower motor gives the equivalent of 62½ horsepower which, added to the remaining load of 50 horsepower, gives a total of 112½ horsepower to be provided for. On a 220-volt, 3-phase system this would require a 350,000 C. M. conductor.

SIZE OF WIRES FOR SINGLE-PHASE MOTORS.

Horse Power	110 Volts		220 Volts	
	Full Load Current	Size of Wire	Full Load Current	Size of Wire
1	12	12	6	14
2	23	8	11	12
3	33	6	16	10
4	44	4	22	8
5	53	3	26	6

SIZE OF WIRES FOR SYNCHRONOUS MOTORS.

(THREE-PHASE.)

MOTORS OF 100 HORSEPOWER OR LARGER.

AMPERES PER HORSEPOWER.

220 Volts		440 Volts	
One Motor	Mains	One Motor	Mains
30	2.4	1.5	1.2

These values are calculated on a basis of 90% power factor, 90% efficiency and 25% overload for single motors.

ECONOMY *renewable* FUSES



Knife Blade Type Disassembled



Cartridge

Economy
"Drop Out"
Renewal
Link and
Winged
Washer

ECONOMY FUSES are made in three general types (ferrule, plug, and knife blade), with a full line of capacity ranges for all commercial voltages. This was the first line of fuses employing an inexpensive bare link for restoring a blown fuse to its original efficiency to be approved in ALL CAPACITIES by the Underwriters' Laboratories, Inc., established and maintained by the National Board of Fire Underwriters.

The fusible elements are of the "Drop Out" renewal link type, accurately rated and of definite design. In operation on short circuits the entire fuse metal does not volatilize; only the two narrow bridges of metal that hold the drop out portion fuse. There is no powdered filler to deteriorate or to solidify.



*Ferrule Type
and "Drop
Out" Link*

The winged washer in knife blade type and the end plug in ferrule type make replacement of link quick and easy.

Since every part of an Economy Fuse excepting the link is good for years of service, their use will give an annual saving of 80 per cent in fuse maintenance costs compared to one-time fuses.

Write "Economy Fuses" Into Your Specifications
for Electrical Fusing.

ECONOMY FUSE & MFG. CO.

Greenview Avenue at Diversey Parkway
CHICAGO, U. S. A.

Sales Offices in Principal Cities—Complete Stocks Carried by All Leading Jobbers

CLEAR SITE Plug Fuses



Clearsite Fuses represent the highest form of convenience in the art of fuse manufacture. They are the only non-renewable plug fuses using the famous Economy "Drop Out" Link, which greatly reduces the internal operating pressure.

The clear window makes it easy to see the link—with the amperage stamped thereon—and when the fuse has blown on overload a gap in the operative section is plainly discernible. When blown on short circuit the blackened window renders vision of the link impossible. There is no doubt of the condition of Clearsite Fuses at all times. Packed in standard carton quantities, and in retail packages of four fuses for 25 cents.



Write "Clearsite Plug Fuses" into your Specifications for branch circuit fusing.

ECONOMY FUSE & MFG. CO.

Greenview Avenue at Diversey Parkway
CHICAGO, U. S. A.

Sales Offices in Principal Cities—Complete Stocks Carried by All Leading Jobbers



More and Better Service

THE Illuminating Engineering Division of the Commonwealth Edison Company is organized for the convenience of Architects.

This division is ready and willing at all times to furnish suggestions for lighting equipment and installations, as well as information on special lighting effects, and illumination data of any description.

Our service to architects includes free layouts for suggested lighting or power installations and the design of special lighting equipment.

We will also obtain for you any desired information, on capacity in any territory within the limits of Chicago, on line extensions, both existing and proposed, and on electricity supply in any district, with location on service outlets.

Telephone Randolph 1200, Local 161, for whatever information you desire.

Commonwealth Edison Company

Illuminating Engineering Division

72 West Adams Street

CHICAGO

RULES AND INFORMATION PERTAINING TO ELECTRIC SERVICE, METERS AND WIRING OF COMMONWEALTH EDISON CO.

See Special Ruling on Page 107

STANDARD FORMS OF SERVICE.

1. The Company's standard service for light and power is available in different forms, the kind of service available depending upon the locality and the amount of energy required, as follows:

2. Direct current, 3-wire, low tension Edison service at approximately 115-230 volts, available for light and power, only within the district boundaries shown on the map on next page. On any installation coming with the shaded portions, or close to the boundary lines of these portions, the customer must consult the Distribution Division of the Company, in order to ascertain the kind of service available, as these shaded territories are at present being served partially from direct current system but are being changed to alternating current service as rapidly as the company's lines can be extended. This consultation is also necessary because near the boundaries, direct and alternating current lines overlap in some places, and, in addition, the boundary lines are from time to time subject to change.

3. Alternating current, sixty cycle, single phase, 3-wire, low tension, transformed service, approximately 115-230 volts, is available for light and power (5 H. P. or less) outside of the boundaries of the direct current phase mains.

4. Where the Company has 3-phase mains, alternating current, sixty cycle, 3-phase, 3-wire, low tension transformed service, at approximately 230 volts, is available for power service for motors of 5 H. P. and larger, 3-phase service, at approximately 460 volts, will be furnished upon request for power installations having an aggregate rated motor capacity of 250 H. P. or more.

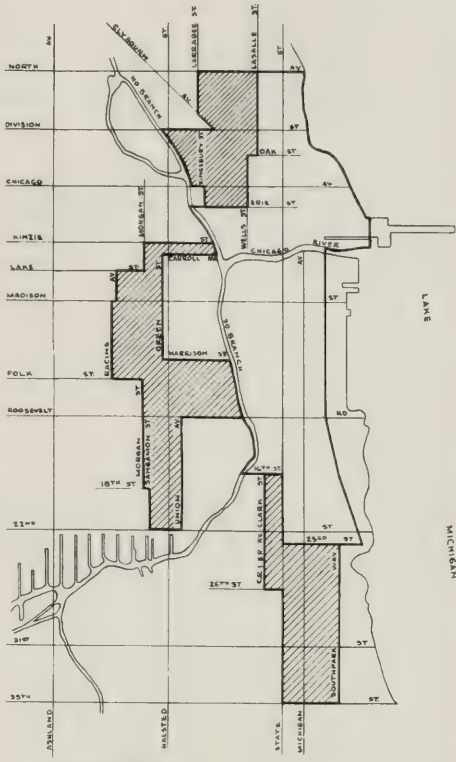
5. Under special conditions, other voltages on the alternating current, 60-cycle system are available, information regarding which may be had upon application to the Company.

6. When service is desired at locations where the Company has no lines or where its lines are not suitable for the class of service desired, a line extension must be arranged for. In such cases the Company will, upon receipt of advice as to the class of service and amount of energy desired, have an estimate prepared of the cost of installing the necessary line extension. If the estimated cost of the proposed line extension is in excess of the cost of a "free extension" as provided by the rules of the Illinois Commerce Commission, the excess cost of the extension must be deposited with the Company by the applicant or applicants.

7. The Company will not be responsible for mistakes of any kind whatsoever which may result from information given orally on the character of its service or the location of its main, unless such information is confirmed in writing.

SERVICE CONNECTIONS. Overhead.

2. The Company will provide at its own expense, for any customer, one overhead service drop for light and, where required by these rules, one overhead service drop for power. The length of this service drop shall in no case exceed 115 feet. Where the length of the service drop exceeds the amount allowed by the Company, a pole must be provided for each 110 feet or fraction thereof, provided, however, that where, due to special conditions, such a span is impossible, single spans between poles may be increased to 125



FOR INFORMATION CALL
RAND 1000 LOCAL 971

□ UNSHADDED AREA WITHIN BOUNDARY
OF HEAVY LINE DIRECT CURRENT
TERRITORY

▨ SERVICE REQUESTS IN THIS TERRITORY
TO BE GIVEN SPECIAL INVESTIGATION

feet in length. The pole must be of cedar, at least 25 feet in length, with a minimum diameter of 6 inches at the top and set in the ground at least 4½ feet. A square timber will not be approved as an intermediate support in place of a pole.

If, in order to give a better appearance, a steel pole is desired, this should be a two-section tubular steel pole, made up of two lengths of standard steel tubing, having nominal diameters of 4 in. and 5 in. The tubes should be joined by a swedge joint. Where the length of the service drop and the service conductors are 3 No. 6 wires or less a single piece of 4-inch standard pipe 20 feet long may be used. These poles must be set in a concrete collar, at least 12 inches in diameter. At the top of the pole, drillings are to be made and a standard spool-type bracket must be mounted in the proper position. This bracket is to be 2 or 3 wire, depending on the character of the customer's installation.

The requirements in the above paragraphs refer to the installation of service connections which do not require a service in excess of the excess of 6 No. B. & S. gauge wires. On installations requiring a service in excess of the above, the Distribution Division of the Company must be consulted for specifications covering the length of spans between poles and the size of poles.

HENRY NEWGARD & COMPANY

Established 1882

Electrical Contractors



549 W. Washington Street

CHICAGO

Phones Franklin 7066-7-8

4. Service outlets should never be more than thirty (30) feet nor less than ten (10) feet from the ground. For buildings of two or more stories in height, the outlet should be brought out at the ceiling of the second floor.

6. Risers used for the support of service wires are objectionable and should be used only in such cases where their use cannot be avoided. A riser must be of clear, sound straight-grained fir or cypress or equally strong material to conform to the rules of the Department of Gas and Electricity of Chicago.

8. Where a one story building is located on the alley lot line, the service, if brought out on the alley side of the building, will not clear the telephone wires if the pole is located on the same side of the alley as the building and will not give the required 13 ft. clearance over the alley (see paragraph 12) (c) if the pole is located in the opposite side of the alley. For this reason, the Department of Gas and Electricity of Chicago will permit a variation from the standard rule requiring services brought to the alley side of the building. On such one story buildings, the service should be brought out on that part of the building farthest from the alley, but in no case must the service outlet be more than 15 feet from the alley line. The service outlet should be placed on the same side of the building as the pole so that the service drop will extend away from the building and not over it. Where a pole is located directly back of a building of the above type, the service outlet, if located away from the alley side of the building, will in some cases, eliminate the necessity of conduit being carried down the pole. The above modification of the rule of the Department of Gas and Electricity of Chicago only applies to one story buildings and will, in many cases, avoid the use of objectionable risers. In many cases, risers and the installing of wires down a pole may be avoided by connecting a rear building to the service drop installed for a front building. In such cases, the customer must install weatherproof wire between the rear building and the front building, but the final connection on the front building service will be made by the Company.

9. Service outlets must not be located on chimney or on fire parapet walls extending above a roof.

10. Service outlets must never be terminated within 1 foot of a down spout which is located on a porch post or porch support.

11. Where a service outlet is terminated on a post supporting a porch, galvanized steel straps or braces must be fastened in such a manner that the post will be firmly held to the joist. Each strap must be at least 1 in. x 12 in. and $\frac{1}{4}$ in. in thickness, and must be fastened to the post and joist by lag screws, 2 into the post and 2 into the joist, such lag screws to be $\frac{1}{4}$ in. x $2\frac{1}{2}$ in. Two straps must be used, one on each side of the post.

12. Where wiring is being installed in buildings under construction which are to have a stucco or stone-coat finish, a substantial form of support for the service bracket must be provided, this support to consist of a 2 in. x 8 in. x 24 in. piece of timber projecting beyond the finish of the building and securely fastened to the stud-ding of frame buildings or by hooks through the wall of brick or tile structures.

Instead of a timber, galvanized eye bolts, having a minimum diameter of $\frac{3}{8}$ in., spaced 8 in. apart, may be used, the eye portion of the bolts to extend at least 2 in. beyond the surface of the building. When bolts are used for the support of a timber or the service, they must extend through and be anchored on the inside surface of the wall, to a substantial metal plate, not less than

$\frac{3}{8}$ in. in thickness and having at least 4 square feet of bearing surface on the inside wall of the building.

The length of service mains to be brought outside of the service outlet and the method of fastening service wires to a building for No. 4/0 service connection and larger, and the method to be used for attachment of service connection for stucco or tile buildings.

13. Clearances.

(a) The service wires must, in no case, be within easy reach from porches, windows, or any other part of the building ordinarily accessible to the occupants.

(b) The service outlet must be so located that there will be at least 24 inches' clearance between it and any telephone or signal wires where attached to the building, and at least 36 inches' clearance must be provided between the service drops of both systems in the open span, in accordance with the rules of the Department of Gas and Electricity of Chicago.

(c) When the Company's pole line is on the opposite side of the street or alley from that of the building to which service is to be given, the service outlet for such a building must be of sufficient height to give at least an 18 ft. clearance between any point of the street or alley and the service drop.

Underground.

1. Where the space beneath the sidewalk is excavated, the service cables will be terminated at a point about 3 feet inside the curb wall. Service mains installed by the customer must be brought to the nearest service entrance, if there be one within 50 feet of his premises.

2. Where there is no service available, application should be made to the Contract Department of the Company to have service installed.

3. Where there is no sidewalk excavation and where there is a basement at the property line, the service cables will be terminated at a point about 3 feet inside the basement wall.

4. Where no basement is available at the property line, the service will be extended underground, at the customer's expense, from the property line to any point designated, but in no case will the service be terminated in any place which is likely to be used for coal storage.

5. In case the customer does not wish to bear the expense of an underground service across his property, the underground service will be brought up on a pole at the lot line, provided the Company's underground mains are available in the rear of the customer's premises. The poles and the overhead service to the building will be installed at the customer's expense, unless the customer will permit the Company to use the pole to supply other customers.

6. On account of obstacles that are frequently met with in the street, it is impossible for the Company to determine in advance the exact location at which the service cables will enter the building. Because of this uncertainty, the service-switch cabinet should not be installed until after the Company has completed the laying of the service duct or pipe into the building.

7. Where the service cables are to supply not more than one set of building mains, the service-switch cabinet must be installed by the customer and located at the service stub in such a manner that the cables will be entirely enclosed. If this is not practicable, a junction-cabinet not less than 15 inches in length, 12 inches in width, and 6 inches in depth for No. 6 cable must be installed by the customer over the underground pipe and enclosing the Company's service cables. This cabinet must be provided with a cover

Pierce Electric Company

ELECTRIC CONSTRUCTION IN ALL BRANCHES

215 West Randolph Street
CHICAGO, ILLINOIS

Our policy in negotiating contracts is to consider the job as a whole, taking into consideration and making allowances for the conditions within your clients business operations, thereby giving the Architect an opportunity to deliver to his client a satisfactory and speedy method of getting his properties into operation.

Below please note list of industries which we have served in the past few years.

PRINTING
FOUNDRIES
REFRIGERATING
TANNERIES
PACKING INDUSTRY

HOTELS
THEATRES
POWER STATIONS
RAILROADS
PHILADELPHIA SUBWAY

For Illinois Central Railroad:

INTERLOCKING PLANTS
AUTOMATIC SIGNAL WORK
CLASSIFICATION YARD CONTROL
CATENARY AND TRANSMISSION

Pierce Electric Company

Not Incorporated

Contracting Engineers

J. N. PIERCE
S. N. TIDEMAN

R. A. MORRISON
PAUL PIERCE

fastened in place with screws. Conduit must be installed by the customer to connect the junction-cabinet with the service-switch cabinet. Where the Company's service mains are larger than No. 6, the dimensions of the junction-cabinet must be obtained from the Inspection Bureau.

8. Where the service cables installed by the Company are terminated in a junction-cabinet enclosing the service cables, the customer's service conduit should be terminated at the junction-cabinet and locked into it. A sufficient length of wire must be left to permit the Company to make the connection to the service cables, inside the junction-cabinet.

9. The service-switch cabinet must be of ample size to permit the safe handling of the service cables, and the switch-panel arranged in such a manner as to permit the removal of the service cables for repairs or replacement without removing the panel. The service-switch must be fitted with lugs for connection to the service cables.

10. Where the size of the installation requires more than one set of underground cables into the customer's premises, the customer must install, at his own expense, a fuse-extension service-switch on each set of cables. A name-plate holder must also be mounted on the panel at each service switch, in order to facilitate ready identification, in case of an emergency on any of the several services.

ENCLOSED TRANSFORMER INSTALLATIONS.

I. GENERAL.

1. These specifications refer to transformer installations made on customers' premises where such installations require enclosures. These enclosures are subject to variation in detail, as local conditions may make necessary. Sketches showing the requirements of the Company will be furnished for each installation.

2. The enclosure for each installation must be constructed in accordance with the rules of the Electrical Code of the Department of Gas and Electricity and of the Building Code of the Department of Buildings of the City of Chicago.

3. The enclosure complete with all necessary facilities must be furnished by and at the expense of the customer, and constructed in accordance with these rules and the sketches furnished by the Company.

4. The enclosures must preferably be located on the first floor of the building, adjacent to an outside wall, accessible to a driveway, and provided with an outside entrance. If the enclosure cannot be so located, a free passageway must be provided from the enclosed space to the outside of the building to facilitate the installation and removal of all equipment. The space must be free from pipes or other obstructions.

5. The enclosures must be accessible at all times to properly authorized employees of the Company and to them only.

6. The necessary conduits from the enclosures to the service point selected by the Company at the property line must be provided by and at the expense of the customer and installed under the supervision of the Company.

7. The Company will, at its own expense, install and connect within the enclosure, the necessary service equipment, such as transformers, oil switches, and auxiliary apparatus.

8. One set of cable connections and service equipment will be provided by the Company for any customer, except that at the customer's request, the Company will install additional points of supply and cables connecting thereto, provided, that the customer shall reimburse the Company for the extra cost of making more than one installation.

The service equipment at all points of supply in such cases shall be the property of the Company.

9. All conduit and cable on the customer's premises, used solely for additional points of supply, shall be installed at the expense of the customer and shall be his property.

10. The Company reserves the right to use these transformer installations to serve customers on other premises. In such cases, a reasonable rental, agreed to by the electrical engineer of the Company, will be paid by the Company for the proportionate part of space occupied by equipment used to supply such other customers.

11. In the following rules, the enclosures will be referred to in connection with 4,000-volt installations as "TRANSFORMER VAULTS," and in connection with installations above 4,000 volts as "INDUSTRIAL SUBSTATIONS."

II. TRANSFORMER VAULTS.

Location.

1. If the vault cannot be located on the first floor, space on another floor will be accepted if provided with the proper facilities. Where so located, a permanent overhead supporting structure, capable of handling a load of approximately 6,000 pounds must be provided by the customer, for raising and lowering the transformers in a vertical position from the delivery level to the desired level. Unless access to this space is had from a floor at the same level, an approved platform at the door level must be provided.

Walls and Ceiling.

1. The enclosing walls must be constructed of concrete, not less than 6 inches in thickness, or of brick not less than 9 inches in thickness.

2. The ceiling must be waterproof and constructed of fire resisting materials, such as concrete, hollow tile, or equivalent.

Floor.

1. The floor must be constructed of concrete of sufficient thickness to carry the weight of the transformers and the weight of electrical equipment to be installed, both of which will be indicated on the sketches provided by the Company. The floor must be laid with a pitch of $\frac{1}{4}$ -inch per foot from the side walls to the drain.

Entrance.

1. A vault must be provided with an outside entrance for the installation and removal of equipment and an inside entrance for the use of the Company's men for operating and inspecting purposes. The entrance provided for handling equipment must have a clear headroom of at least 7 feet above the threshold and a minimum clear width of 4 feet, 6 inches.

2. A concrete threshold 6 inches high must be installed in all doorways. All doorways must be thoroughly closed by means of an approved tight-fitting, fireproof door. The door must be so hung as to swing outward from the entrance, and must be provided with a hasp suitable for a standard padlock, which latter will be provided by the Company.

3. Surface entrances to basement or side-walk vaults must be equipped with transformer manhole frames and covers, or hinged steel doors approved by the Company.

4. All passageways between the entrance and the vault must have the same clear headroom and width as specified for the entrance.

Headroom.

1. Clear unobstructed headroom of not less than 9 feet must be provided in the vault.

Jackson-
Franklin
Bldg.,
Chicago



A. S. Abschnur,
Architect

Fuchs Electric Company

Electrical Contractors

Telephone Randolph 5062

129 S. La Salle Street, Chicago

Drainage.

1. The floor of the vault must be provided with an adequate system of floor drainage to take care of a possible overflow of oil or water.

Ventilation.

1. Sufficient ventilation must be provided to maintain the transformers within their safe operating temperature range. All ventilating openings into the building not connected to chimneys or flues must be provided with automatic or manually-controlled dampers to prevent the emission of smoke or fire. The arrangement and size of ventilating openings will be shown on sketches provided by the Company.

2. If natural ventilation is inadequate, forced ventilation must be provided. Plans for forced ventilating equipment and methods of installation and control must be submitted to the Company for approval. Ventilating equipment must be of sufficient capacity to completely change the air every two minutes.

Floor Space.

1. The vault must have a floor space in proportion to the transformer capacity to be installed, the exact size in each case to be specified by the Company. A customer's drawings of the vault must be submitted in duplicate to the Company for approval.

2. The room must be rectangular in shape, not less than 11 feet in width and from 26 to 37 feet in length, depending upon the number of transformers to be installed.

Vault Equipment.

1. All electrical equipment required for switching, transforming, and protective purposes, including primary and secondary bus work in the vault, will be installed, maintained and operated by, and at the expense of, the Company.

2. The customer must extend all secondary service cables to points designated by the Company, inside the vault. Such cables must be of sufficient length to be connected to the secondary busses, and be equipped with necessary lugs ready for connection. The final connection of the service cables to the busses will be made by the Company.

Primary Cable.

1. The primary cable required on the customer's premises to connect the vault equipment to the Company's system will be installed by the Company at the expense of the customer.

Meter Wiring and Service Switch.

1. The customer must provide a suitable panel or space on the switchboard outside of the vault for the installation of the Company's meters; and provide thereon the wiring, test links, and terminals required for such meters. The customer's secondary service switch must be placed outside the vault.

Lighting.

1. The necessary conduit and outlet boxes for the vault lighting system must be installed by the customer as a part of the vault structure. The location of lighting outlets will be shown on sketches furnished by the Company.

III. INDUSTRIAL SUBSTATIONS.

General.

1. The installation is to be placed in two adjacent fireproof rooms provided by the customer and must follow the specifications herein set forth and such supplemental specifications as the Company, may, in special cases, provide. One of these rooms containing the line and transformer primary switches, bus bars, and all 12-000-volt equipment will be known as the "Switch Room." The other containing the transformers and auxiliary control and protective equipment will be known as the "Transformer Room."

2. These rooms must at all times be readily accessible for inspection and repairs and where located above the ground floor a permanent overhead supporting structure, capable of handling a load of approximately 24,000 pounds, must be provided for hoisting the transformers to the required level. Unless access to such rooms is had from a floor at the same level, an approval platform at the room level must be provided, together with a stairway to reach same from the floor below or from the ground, so arranged as to give convenient access to the rooms at all times.

Meter Panel.

1. The customer must provide a suitable panel or space on a switchboard outside of the Switch and Transformer Rooms for the installation of the Company's meters and must also provide thereon the wiring, test links, and terminals required for such meters.

Ownership.

1. All building work in connection with the Switch and Transformer Rooms, including the concrete switch and bus structure in the Switch Room, and the necessary conduit in walls and floors, must be installed by and at the expense of the customer and shall remain his property. Detail plans for the Switch and Transformer Rooms, including the concrete structure, will be furnished by the Company.

2. All electrical equipment required for switching, transforming, and protective purposes, including primary and secondary bus work, in the Switch Room and Transformer Room, will be installed, maintained, and operated by and at the expense of the Company, with the exception that where the physical location of a customer's service entrance is not adjacent to the Company's secondary busses, the customer will reimburse the Company for the additional expense necessary to reach this remote location, and further, that the customer will extend his lighting service cable to the metering current transformers at the lighting transformer, ready for the Company to connect to its secondaries.

3. In case of a loop service, the Company will furnish, install, and maintain at its expense all 12,000-volt cable.

Lighting.

1. Approximately 8 lighting outlets are required in each of these rooms. Lighting service is to be 115 volts A.C.

SWITCH ROOM

Structure.

1. The Switch Room must have a minimum floor area of approximately 325 square feet (preferable 13 x 25 feet) with a minimum head room of 12 feet. Standard fireproof doors must be provided to give access to, and emergency exits from, this room. In addition to the standard latches provided for these doors, they must also be equipped with bolts or locks. Where locks are required, standard cylinder locks will be furnished to the customer by the Company. All doorways must have a 6-inch threshold. Openings suitably located and equipped with adjustable louvers must be provided for the ventilation of this room.

Equipment in the Switch Room.

1. The electrical equipment in the Switch Room will consist of high-tension switches, disconnects, and other necessary auxiliaries to protect the customer's service.

TRANSFORMER ROOM

Structure.

1. The Transformer Room must have a floor space in proportion to the transformer capacity to be installed, (the exact size in each case to be specified by the Company,) and the headroom must be at least 12 feet.



One N. La Salle St., Chicago
K. M. Vitthum & Co., Inc., Architects
John Griffiths & Son Co., Builders

DEARBORN ELECTRICAL CONSTRUCTION CO.

Electrical Engineers and Contractors

205 W. Wacker Drive

Telephone State 0397

CHICAGO

An exterior fireproof door must be provided in this room, approximately 6 feet wide by 10 feet or more high, which will give ready access for the installation of the electrical apparatus. This doorway must have a 6-inch threshold and the door must be equipped with latches and bolts in addition to the standard cylinder lock furnished by the Company.

2. The floor of the Transformer Room must be provided with an adequate system of floor drainage to take care of a possible overflow of oil or water.

Equipment in the Transformer Room.

1. The electrical equipment in the Transformer Room will consist of the necessary power and lighting transformers, relay and control equipment, and high-voltage connections between the Switch Room terminals and the primary terminals of the transformers; also on the secondary side of the transformers all necessary copper bus and supporting framework between the secondary terminals of the transformers and the metering current transformers, which will be located as near as possible to the main transformer terminals.

Ventilation.

1. The customer must provide for air supply and exhaust in sufficient amount to insure proper cooling of the transformers. Where the temperature of the surrounding air is sufficiently low, properly located louvres of adequate size in the side walls, in addition to roof ventilators or their equivalent in exhaust duct to outside air, may be sufficient. Where the location renders this method of cooling inadequate, forced ventilation must be provided by the customer and should be so arranged that the supply will be adequate at all times. The Company will inform the Customer regarding the details of the ventilating provisions in each case. The system of ventilation must provide for a complete change of air in the Transformer Room every two minutes, assuring proper cooling of the maximum transformer capacity, which may be installed in the particular Transformer Room. Plans for forced ventilating equipment and methods of installation and control must be submitted to the Company for approval. If adequate ventilation is not available, or if the customer's load conditions require the installation of water-cooled transformers, the customer must provide suitable water supply and waste connections for this method of cooling, the details for which will be furnished by the Company.

WIRING.

Meter Connections.

1. Wiring must be so arranged that a separate meter may be installed for each class of service supplied under the Company's schedule of rates, as follows:

I Rate A.

1. Available for any customer using the Company's standard service for lighting purposes or for both lighting and power purposes, provided that electricity will not be furnished hereunder for welding machines, wireless telegraph apparatus, or other power apparatus in which the use of electricity is intermittent or subject to violent fluctuation and the operation of which may interfere with lighting service.

2. Where the rated capacity of the customer's installation is $1\frac{1}{2}$ K. W. or less, the maximum demand is determined in accordance with a table set forth in the rate schedule, which provides for different values of demand for commercial and for residence lighting. The arrangement of meter connections of such installations must be in accordance with the following regulations:

(a) The wiring of residence and commercial installations must be arranged for separate watt-hour meters,

(b) The lighting of halls, entrances, and basements of apartment buildings will be considered as commercial lighting provided that where the hall, entrance, and basement lighting installation has a rated capacity of 200 watts or less and where the owner occupies one of the apartments in the building as his place of residence, this lighting load may be connected to the meter for his apartment, and, if so connected, such an installation will be considered as residence lighting during the period of such occupancy.

(c) Where apartments and stores or shops are in the same building the apartment lighting will be considered as residence lighting and the store or shop lighting will be considered as commercial lighting, and the wiring should accordingly be arranged for separate meters, provided, however, that if the customer desires, both installations may be combined on one meter, and the combined installation will be considered as commercial lighting. (For combined installations exceeding $1\frac{1}{2}$ K. W. see 3-(b) below.)

(d) Where a portion of a store or shop is used as living quarters, and the wiring is arranged for a single meter for both the store or shop and the living quarters, the installation will be considered as commercial lighting.

3. (a) Where the rated capacity of a customer's installation is more than $1\frac{1}{2}$ K. W., the wiring must be arranged for the installation of demand meters.

(b) In case the residence and commercial lighting installations of a customer have an aggregate rated capacity of over $1\frac{1}{2}$ K. W. and are in the same building, both installations should be arranged for connection to one watt-hour meter, with demand-meters.

II Rate B.

1. Power service is supplied under this rate, and is defined as "electric service used for other purposes than lighting." Service for photographic printing, bath cabinets, and other kinds of equipment which are not used for general illumination, will be considered as power service and may be served under Rate B, if desired.

2. In the case of direct current installations, having rated capacity of more than $1\frac{1}{2}$ K. W., the maximum demand is measured, and provisions must be made for setting a demand-meter.

3. In the case of alternating current installations having a rated capacity of 10 H. P. or more, provisions must likewise be made for setting a demand-meter.

III Rate C.

1. The lighting and power service for large users may be combined under Rate C. However, on the alternating current system a separate service and meter may, at the option of the Company, be provided for the lighting service, and in such cases the wiring must be arranged accordingly for meters.

Residence and Apartment Loads.

1. Every residence and apartment lighting installation which does not exceed 3,000 watts, or 48 sockets must have a 2-wire service main and 2-wire meter loops, as such an installation will be connected to the Company's system by two service wires at 115 volts. Where the installation exceeds 3,000 watts, or 48 sockets, it must be wired for 3-wire service and a 3-wire meter. All wall receptacles other than brackets will be figured at not less than 100 watts each.

Commercial Loads.

1. Every business lighting installation of over 1500 watts must have a 3-wire service main and 3-wire meter loops except where the installation consists of 1-2000 watt circuit only. This must obviously be connected 2-wire. If the installation is 1500 watts or less, it must be wired with a 2-wire service



Campbell Soup Co., Chicago plant

Bathey & Kipp, Inc., Engineers

L. H. LAMONT & COMPANY

Electrical Contractors



Telephone Randolph 3720

9 South Clinton Street
CHICAGO, ILL.

Established 1910

EXPERIENCE WIDE AND VARIED

main and 2-wire meter loops. Motors operating on 115 volts and heating appliances on the lighting service will not be considered in determining 2-wire and 3-wire installations where the rated capacity of such equipment does not exceed 25% of the lighting load.

Business and Residence Loads in Same Building.

1. On installations where there are stores and apartments in the same building, the rule governing the service and meter installation is as follows:

Where the total connected wattage is 3000 watts or less, add to the total connected wattage of the stores $\frac{1}{4}$ of the connected wattage of the apartments, and, if the total is 1500 watts or less, the service mains and meter loops must be 2-wire. If this wattage, however, is in excess of 1500 watts, service mains must be 3-wire but the meter loops will be governed according to the rules above on residence and commercial lighting. Where the total connected load is in excess of 3000 watts, the service must be 3-wire.

Motor Loads.

1. In direct current territory where the aggregate power load does not exceed 10 H. P., the motor should usually be wired to connect to the lighting meter.

2. In alternating current territory, the fluctuation in voltage caused by the starting currents prevents the connecting of motors larger than $\frac{1}{2}$ H. P. of the split-phase type, or larger than 1 H. P. of the repulsion-induction type, to the lighting service, except in special cases. Two or more motors, not larger than the above mentioned sizes, may be connected to the lighting service where the aggregate does not exceed 2 H. P.

Miscellaneous Loads.

1. Single D. C. stereopticons, outlets for battery charging, and other devices which are operated most economically at 115 volts will be approved for this voltage. Where there is an installation of more than one such device in the same premises, they must, if the total wattage of the installation exceeds 1500, be connected to a 3-wire main and be balanced as nearly as possible.

2. Every alternating current vehicle-charging mercury arc rectifier in a private garage must be connected to the customer's lighting service, provided such a service is already installed. If the existing lighting service is a 2-wire service, a 3-wire outlet must be provided.

3. If, at the time the rectifier is installed, there be no existing lighting installation in the premises, and later the customer desires to put in a lighting installation, such an installation must be wired for a 3-wire service.

4. All rectifiers requiring an input of more than 2 K. W. must be operated at 230 volts.

5. In theaters, all alternating current or single phase motors, and such motion picture and spot arcs as are not supplied through 3 phase converting apparatus, must be connected to the same meter.

6. Alternating current arcs requiring more than 2 K. W. must be operated at 230 volts.

7. Where transformers are used in connection with motion pictures arcs or spot arcs they must be operated at 230 volts.

8. In the case of welding machines, X-ray machines, hoists, elevator motors, furnaces, and other installations of similar character, where the use of electricity is intermittent or subject to violent fluctuation, the Company reserves the right to require the customer to provide, at his own expense, suitable wiring or equipment to limit, in a reasonable degree, such intermittence, or fluctuation, where in the Company's judgment, such ap-

paratus is necessary to prevent undue interference with the Company's service.

Auto Transformers.

1. Where the lighting is connected to the power service by the use of an auto-transformer, as under Rate "C," such transformer must be provided at the expense of the customer. The auto-transformer must be connected between the two mains having the least difference of potential to the earth. Where the load is 20 K. W. or less, the capacity if the auto-transformer should be not less than 25% of the connected load in watts.

Voltage Regulation.

1. The wiring installed in the customer's premises should be of such capacity that the entire connected load can be carried with a loss in voltage of not more than 2% between the service entrance and the most remote lamp on the premises.

Switchboards.

1. Specifications and blue prints for service and meter-switchboard installations must be submitted to the Distribution Division of the Company for approval before construction of the switchboard is begun.

2. Fuses must be so arranged that they will be readily accessible for the purpose of replacement, and to this end, it is recommended that no more than three rows of switches be placed on a switchboard.

3. To prevent overheating of switches, fuses, and cables, it is recommended that all the lugs have a conductivity of not less than 60% of that pure copper and that their cross-sectional area be such that they will not be required to carry continuously more than 600 amperes per square inch. They should have a bolting contact surface of not less than 1 square inch for each 150 amperes of current.

4. The general arrangement of the connections on the back of the board must be such as to render it possible to make repairs or alterations with a reasonable degree of facility and safety while the board is in service.

5. The bus bars must be rigidly supported and the arrangement of the feeder cables between the terminal of the conduit system and the back of the switchboard must be made in a systematic and orderly manner and the cables must be segregated as far as possible, with a view to minimizing the possibility of serious interruption to the service.

6. Where the Company's service cables are extended inside of the customer's premises to the switchboard and where such cables are not protected by duct or conduit they must be properly roped and cemented at the expense of the customer.

Cutouts.

1. Fuse-blocks and service-switches must be equipped with fuses of approved type and capacity at the time of their installation.

2. The neutral wire of a 3-wire service-switch or cutout block for branch mains, except for 3-phase, must not be fused.

3. The neutral wire must be connected to the center blade of all 3-pole switches except for 3-phase. On 3-phase installations the two phases having the least difference of potential to earth must be connected to the two outer blades of the service-switch.

4. Switches and fuse blocks must not be installed above or in close proximity to laundry tubs, sinks, or other plumbing fixtures.

Grounding Conduit on Neutral Service Wire.

1. The use of the neutral service wire for grounding conduit is not permitted. The conduit should preferably be grounded to the cold water piping system, in accordance with the rules of the Department of Gas & Electricity of Chicago.

L. K. Comstock & Company

INCORPORATED

CONSTRUCTING ENGINEERS

Complete Electrical Installations

333 North Michigan Ave.

Chicago, Illinois



New York Chicago Montreal

2. The customer must ground the neutral wire of his installation separately from the ground provided for the conduit system. This neutral ground must be installed according to the rules of the Department of Gas and Electricity of the City of Chicago. 3-phase and 2-wire, 230 volt single phase systems having no wires within the building at ground potential, are not to be grounded at the building service.

AUXILIARY OR BREAKDOWN SERVICE

1. Where a customer contracts to use the Company's service as an auxiliary or breakdown service in connection with his usual source of supply, he must, in case the number of kilowatts which the Company is obliged to stand ready to supply under the contract be less than the estimated maximum of the customer's plant, as estimated by the Company, furnish and install a circuit breaker of a type approved by the Company. This circuit breaker shall be set to break the connection with the Company's service in case his maximum demand shall at any time materially exceed the number of kilowatts which the Company has agreed to supply.

2. The circuit breaker must be installed by the customer at a suitable location between the Company's meter and the customer's load, and must be in a steel cabinet so constructed that it can be sealed by the Company.

ADDITIONS AND ALTERATIONS

1. When any change in the size of a customer's installation is made, the Company must be informed, so that it may inspect the installation and provide service and meter of the proper capacity. If alterations are to be made in a building, which may disturb the electric wiring and require the re-location or removal of the Company's meter, the Company must be notified in advance, in order that the changes may be given proper attention. If it is necessary to move the meter to a new location, this change will be made if meter fittings are provided. A temporary location and meter fittings must be provided by the customer, if electricity is desired during such alterations, but under no circumstances will the use of electricity be allowed without a meter.

APPARATUS.

Welders and Furnaces.

Call Commonwealth Edison Co., Randolph 1280 for information.

X-Ray Machines.

Call Commonwealth Edison Co., Randolph 1280 for information.

RADIO TELEPHONE AND TELEGRAPH EQUIPMENT

1. All radio telephone, and telegraph apparatus, employing set-up transformers which require an input of more than 250 watts and all spark sets must be wired for a separate service connection.

2. All such step-up transformers of any capacity must be protected by an approved spark gap.

3. No ground will be permitted on spark equipment, except on the secondary side of the oscillation transformer. Such a ground must be connected to the cold water piping at a point nearest the street mains.

4. All high tension or high frequency wiring used in connection with the apparatus must be located as remotely as possible from the meter and wiring of the building.

5. Motor generator sets supplying radio telephone and telegraph apparatus shall be subject to the rules applying to motors.

6. Where a radio telephone or telegraph set requires more than 2 K. W. the coils must be operated at 230 volts.

Electric Ranges, Ovens, and Heating Appliances.

1. Electric ranges and other heating appliances in which the aggregate rating of

the heating units is not more than 2 K.W., will be connected for 115 volt, 2-wire service. Where the aggregate rating of the heating units exceeds 2 K.W., they must be so arranged that they may be connected to a 3-wire, 115-230 volt circuit, and the units must be balanced as nearly as possible on each side of the circuit.

2. Electric ranges and heating appliances for family use must be connected to the lighting service, if one is installed.

3. Electric ranges, ovens, and heating appliances of 10 K.W. and less, installed in places of business, must be connected to the lighting service, if the customer has a lighting service only. If, however, there is both, a lighting and a single-phase power service, or a single-phase power service only, such apparatus should be connected to the power service. Where the K.W. rating is in excess of 10 K.W., or where the heating load is intermittent, inquiry should be made of the Distribution Division of the Company, as to how the particular installation should be connected.

Nameplates.

1. All electrical equipment such as motors, welders, furnaces, X-Ray and radio apparatus, heating utensils, and the like, must be provided with nameplates showing the rating of the apparatus. This rating must be in kilowatts, horsepower, kilo-volt amperes, or amperes and volts, cycles, phase; according to the nature of the apparatus. The character of current required for the operation of such apparatus must also be designated.

MOTORS.

General.

1. The following motor regulations are necessary for the purpose of securing uniform service for all customers, as the successful operation of motors on the same circuits with lighting apparatus requires that the normal voltage of the supply circuit be closely maintained.

2. In the case of hoist or elevator motors, welding machines, furnaces, and other installations of similar character, where the use of electricity is intermittent or subject to violent fluctuation, the Company reserves the right to require the customer to provide, at his own expense, suitable wiring or equipment to limit, in a reasonable degree, such intermittence or fluctuation, where in the Company's judgment, such wiring or equipment is necessary to prevent undue interference with the Company's service.

3. Stationary vacuum-cleaner motors of over 1 H.P. which are used in apartment buildings, must be so wired that separate meters for them can be installed. This rule prohibits the connection of these motors to the individual tenants' meters.

Direct Current.

1. Direct current motors of $1\frac{1}{2}$ H.P. and smaller may be operated on either 115 or 230 volts. Motors larger than $1\frac{1}{2}$ H.P. must be operated on 230 volts.

2. A starting resistance is recommended in connection with all direct current motors, but motors not larger than $\frac{1}{2}$ H.P. of the shunt type, $\frac{3}{4}$ H.P. compound, and 2 H.P. series wound, not requiring a starting current in excess of the values given in the starting current tables, may be installed without starting resistance.

3. Direct current motors aggregating 10 H.P. or less must usually be wired so that they may be connected to the lighting meter.

Alternating Current.

1. All alternating current motors which start frequently, such as those operating coffee mills, meat grinders, shoe repairing

INDIANAPOLIS

CLEVELAND

HATFIELD ELECTRIC COMPANY

ELECTRICAL CONTRACTORS



100 North La Salle Street
CHICAGO

Telephones: CENTRAL 6724-6725

machines, electric pianos, pumps, carbonators, etc., must be wound for and connected so as to operate on the Company's 230 volt service, except that the repulsion induction type of motor, of less than ¼ H.P., may be operated on 115 volt service.

2. Split-phase motors of ¼ H.P. and smaller, which do not start frequently and any repulsion-induction motor of ½ H.P. and smaller, may be operated on 115 volts when the starting current does not exceed 15 amperes, provided the lighting service is not interfered with by the operation of the motor.

3. The wiring must be so arranged that all motors of the repulsion-induction type of 1 H.P. and less, or of the split-phase type of ½ H.P. and less, may be connected to the lighting service and meter. Either type of motor above these sizes must be wired for separate service and meter. When the aggregate rating of two or more motors of the types mentioned does not exceed 2 H.P., they must be wired to the lighting service. This will require 3-wire service and 3-wire meter loops, where 230 volt motors are installed. Where larger motors are installed, or where the aggregate is more than 2 H.P., the wiring must be so arranged that all motors can be connected to a separate service and meter.

4. Special permission may, in some cases, be obtained from the Distribution Division of the Company to connect the lighting service, motors larger than 1 H.P. of the repulsion-induction type, or ¾ H.P. or larger of the split-phase type, where these motors operate stationary vacuum-cleaners and house-pumps. The granting of this special permission will depend on the size of the building, the capacity of the Company's lines, and the building mains.

I. Single Phase System.

1. When single phase motors or other apparatus are connected to one phase of a 3-phase installation, they must be connected between the two wires having the least difference of potential to the earth. The Distribution Division of the Company must be notified when any single phase motor is to be connected on a 3-phase installation.

2. No motors larger than 5 H.P. will be supplied on the single phase system except by special permission given in each case by the Distribution Division of the Company.

II. Three-Phase System.

1. Motors of 5 H.P. or more are supplied from the 3-phase system in a large part of the alternating current territory, but inquiry should be made of the Contract Department of the Company as to the proximity of 3-phase lines to any particular location at which such power may be desired.

2. 3-phase service will not be provided for installations aggregating less than 5 H.P. unless the customer deposits with the Company a sum equivalent to the excess cost to the Company of installing a 3-phase service and meter, above the cost of installing a 3-phase service and meter, plus the excess cost of installing a 3-phase line extension over a single phase extension, provided such an extension is required. In case the customer's power installation shall subsequently be increased to a total rated capacity of 5 H.P. or more, the Company will return the amount of the deposit, provided the additional motors installed are 3-phase.

3. Reverse-phase relays or series-wired hatch-limit switches must be installed on all 3-phase elevator, crane, and similar installations, as required by the Department of Gas and Electricity of Chicago.

1. On all new installations of motors and other power equipment, aggregating 100 H. P.

or over, the power factor of the total power installation must be at least 85% at normal full load.

2. Whenever any motor or other power equipment is added to the power installation of any present connected customer, increasing the aggregate horsepower of his power load to 100 H. P. or over, the power factor of the total power installation must be at least 85% at normal full load.

3. The Company reserves the right to test, at any time, all motors and other power equipment on the customer's premises, for starting current, efficiency, power factor, or other characteristics which may affect the Company's service.

4. The Company reserves in the case of any customer, the right to place special limitations other than those specified in the section entitled "Starting Current," on starting and pulsating currents of motors and other power equipment, where, in the Company's judgment, such limitations are necessary to prevent objectionable disturbance on its lines. In any event, the pulsating current of any large motor must not exceed 66% of the rated full load current of the motor.

1. All motors of 7½ H. P. rating, and above, must be equipped with starting apparatus.

2. Every starting device must be equipped with a no-voltage release which will cause it to be thrown to the starting position, or the circuit opened entirely, in case of an interruption to the power supply. Motors which are equipped with an internal resistance, making it unnecessary to install a compensator in order to reduce the starting current, must be equipped with a no-voltage release device unless the internal resistance is automatically cut in by the reduction of the motor speed when the power circuit is opened. For motors of large capacity which are difficult to start, the no-voltage release must have a time element relay, which will prevent the opening of the circuit in the event of momentary voltage fluctuation.

3. In the case of the star-delta starting method, the starting-switch must be so arranged that it cannot be thrown into the running position before being thrown into the starting position. Motors started by this method must be equipped with a no-voltage release device.

4. Special permission will be given for the connection of special high-resistance-rotor elevator motors not larger than 10 H.P. without the use of a starting device, provided, the starting current does not exceed the values given in the table for starting currents.

Starting Current.

1. As voltage regulation is affected by the amount of current taken from the line, a motor exceeding the maximum allowable starting current will not be connected to the lines of this Company, since its operation would prevent satisfactory service to other customers using the lighting service of the Company. The instantaneous current (determined by test or based on the value guaranteed by the manufacturers) drawn from the lines by any motor (with the starting device, if any required, in the starting position) must not exceed the value for the rated horsepower of such motor, as obtained from the following tables:

2. SINGLE-PHASE—60-CYCLE

	Horsepower	Volts	Starting Amperes	
			A*	B*
½	H. P. and below.....	220	15	20
¾	H. P. and 1 H. P.....	220	20	27
1 ½	H. P.	220	22.5	30
2	H. P.	220	30	40
3	H. P.	220	45	60
5	H. P.	220	75	100

POST ELECTRIC COMPANY

Contractors & Engineers

BUILDERS BUILDING
228 NORTH LA SALLE STREET
CHICAGO, ILL.

Phone Central 4818

THREE-PHASE—60-CYCLE

	Horsepower	Volts	Starting Amperes	
			A*	B**
1	H. P.	220	25	26.6
1½	H. P.	220	27.5	36.6
2	H. P.	220	35	46.6
3	H. P.	220	45	60
5	H. P.	220	65	86.6
7½	H. P.	220	86	115
10	H. P.	220	106	141
15	H. P.	220	148	197
20	H. P.	220	188	251
25	H. P.	220	228	304
30	H. P.	220	270	360
35	H. P.	220	277	370
40	H. P.	220	285	380
50	H. P.	220	300	400
Amperes per H. P.—				
60	H. P. and above.	220	6	8

* Current values under A are those indicated by a suitable, well-damped ammeter in the motor circuit on the line side of the starting device for the installation of a single motor installed and connected to its load, and are 75 per cent of the permissible locked rotor values.

** Current values under B are those similarly indicated when testing a motor with the rotor locked.

3. DIRECT CURRENT

Shunt and Compound Wound

	Horsepower	Volts	Starting Amperes	
			Motor connected to Rated load	
1	H. P. and below	220	12	
1½	H. P.	220	18	
2	H. P.	220	24	
3	H. P.	220	36	
5	H. P.	220	45	
7½	H. P.	220	68	
10	H. P.	220	90	
15	H. P.	220	135	
20	H. P.	220	180	
25	H. P.	220	228	
30	H. P.	220	270	
35	H. P.	220	315	
40	H. P.	220	360	
50	H. P.	220	450	
Amperes per H. P.—				
60	H. P. and above	220	9	

Fire Pumps.

1. Fire-pump motor installations must be made in accordance with the rules of the authorities having jurisdiction over such installations.

2. Motors for fire-pump installations shall be of the shunt type for direct current system and of the current transformer type for alternating current systems. A meter-cabinet of shape and dimensions as shown on the drawings on pages 60 and 61, must be furnished and installed by the electrical contractor. This cabinet must be provided with a door which can be fastened with a pad-lock, which will be furnished by the Company. The cabinet may be located at any point in the service run, provided it is readily accessible and not subject to moisture or vibration. Conduits carrying service mains must enter the cabinet in a standard manner, and the cables must be long enough to connect with lugs on the shunts or current-transformers. The lugs for the shunts or current-transformers will be furnished by the Company, but are to be installed by the customer at his expense. A 1 in. slate base for the mounting of the meter and other equipment, standard cartridge-fuse cutout-block of capacity shown, must be furnished and installed by the customer at his expense.

3. Where a separate service is required for a fire pump, the customer must pay the cost of the service installation. Where a meter has been furnished by the Company

for regular power load, the usual rental will be charged for the separate fire-pump meter, as provided under "Meters," sub-title "General," paragraph 2, page 43. In case a printing meter is required the usual rental will be charged and the customer must pay for installation of such meter.

MOTOR TABLE

Showing voltage and wiring instructions for single phase motors for both intermittent and non-intermittent classes of service.

Size	Class of Service	Voltage	Repulsion-Induction Motors	Split-Phase Motors
			How Wired	How Wired
¾ h.p. Intermitt.	115	To light meter	230 To light meter	
¾ h.p. Intermitt.	115	To light meter	230 To light meter	
¾ h.p. Intermitt.	115	To light meter	230 To light meter	
¾ h.p. Intermitt.	230	To light meter	230 Separate service	
1 h.p. Intermitt.	230	To light meter	230 Separate service	
1¼ h.p. Intermitt.	230	Separate service	230 Separate service	
¾ h.p. Non-Inter.	115	To light meter	115 To light meter	
¾ h.p. Non-Inter.	115	To light meter	115 To light meter	
¾ h.p. Non-Inter.	115	To light meter	230 To light meter	
¾ h.p. Non-Inter.	230	To light meter	230 Separate service	
1 h.p. Non-Inter.	230	To light meter	230 Separate service	
1¼ h.p. Non-Inter.	230	Separate service	230 Separate service	

METERS.

General.

1. The Company will install one meter or one unified set of meters for one class of service.

2. A monthly rental charge for each additional watt hour or demand meter is made by the Company when, at the request of the customer, and for his convenience, there is an installation of more than one meter on his premises for one class of service. This rental is based on the size of the meter installed.

3. The Company must be consulted whenever it is necessary to know in advance the type and size of meter which a given installation will require. Information relative to the type of watt-hour meters and maximum demand meters to be used on large installations must be obtained from the Distribution Division of the Company before wiring is completed.

Location.

1. All meters must be installed in a suitable place as near as practicable to the point at which the service enters the building. The wires should be enclosed in a continuous metal conduit, containing no junction or outlet-boxes between the service entrance and the meter. The installation of load-wires in the same conduit is not allowable. In office buildings, special meter-closets of ample size must be provided on each floor; in apartment buildings, all meters should preferably be installed in the basement, and the circuit to each apartment should be carefully labeled. In residences, meters should be installed in the basement, or in a rear hall, and not in the attic.

2. The requirements of a "suitable place" for a meter are the following:

(a) Meters must be accessible to the Company's employees at all reasonable times, and must be so located that they may be easily read, inspected, and tested, with a minimum of annoyance to the tenants. Small capacity meters must be so installed that the top of the meter fitting is not more than six feet from the floor, and on meters of a capacity of 100 amperes and above, this distance must be not more than 4 feet 6 inches. Meters must not be placed in bedrooms, closets, bath or toilet rooms, or in any room commonly kept locked, in too close proximity to coal bins, in elevator or ventilator shafts, near stoves, radiators, sinks, wash tubs, steam piping, heaters, or boilers. Meters must be at least 3 feet from any gas meters



1301 Astor Street Apartment Bldg., Chicago, Ill.
Philip B. Maher, Architect

ROBT. J. SAMPLE COMPANY

Incorporated

ELECTRICAL CONTRACTORS - ENGINEERS

Telephones Superior 0621-0522

113-115 West Austin Avenue
CHICAGO

or gas piping unless a suitable barrier is provided. Where meters are to be installed in a narrow passageway or in a narrow space such as back tanks, switch-boards or machines, the spacing in front of the meter board must be as follows: For 30 and 60 ampere meter-fittings, 3 feet and for 100 ampere fittings and above, greater space, the amount to be determined by the Inspection Bureau of the Company, depending on the character of the installation. Meters placed behind boilers or heating tanks which are not insulated to prevent radiation of heat, or behind machines in motion, must be more than 3 feet from such equipment, and in such cases the amount of space is to be determined by consultation with the Inspection Bureau of the Company.

(b) The location selected must be free from moisture. A watthour meter must never be placed under a water pipe from which water may drip, as a result of condensation. When a damp location is unavoidable, a moisture proof cabinet must be provided by the customer to contain the meter.

(c) The location must be free from vibration. Where traffic is heavy, or cars are passing, meters should be placed upon a wall at the building-line, rather than upon the front curb wall, and must never be placed under the sidewalk, except by special permission from the Distribution Division of the Company. They must not be placed on any insecure partition, over a doorway, or in a stairway.

(d) Meters must be located, if possible, so that they will not be exposed to mechanical injury. If this is unavoidable, a suitable cabinet must be provided by the customer to contain the meter, so as to protect it thoroughly from possible damage.

(e) The meter location must be as free as possible from magnetic disturbance. Meters must not be installed in close proximity to motors or generators or cables carrying heavy loads. Cabinets for direct current meters must be of asbestos board or non-magnetic metal.

3. When meters are to be installed for construction work, substantial cabinets of weather-proof construction must be provided by the customer to protect them from injury. The final connections between the customer's wiring and the Company's mains will, in every instance, be made by the Company. When it is possible, a meter location which can be used throughout the construction period should be selected at the outset.

4. Meter-cabinets must be of ample size to permit the safe handling of wires for connecting, disconnecting, or testing the meters. If a metal cabinet is used, the inside must be lined with suitable insulating material.

5. Meter-fittings for private garages must be so located that the meter can be read without the necessity of entering the garage except in cases where the garage is open or where a key can be obtained on the premises at all reasonable hours. A meter can be read without entering the garage if installed so that it faces a window made in the wall of the garage. This window must be covered by glass so as to render the meter visible and in addition, protect it from damage and theft. When this method is used, the meter board must be hinged or otherwise installed so that the meter will be accessible for testing. Subject to the approval of the Company, other methods of installing the meter so that it may be read without entering the garage will be considered.

Meter Loops.

1. Meter loop fittings must be provided on all installation where the meter installed is of smaller capacity than 200 amperes. The size of a meter is determined by the amount of current required on any given installation

and not by the connected load. Therefore, it is necessary to take this fact into consideration when determining whether or not a meter fitting is necessary.

2. When meter loops are provided for meters of smaller capacity than 200 amperes an approved meter safety cabinet and meter connection-block must be installed. Approved safety cabinets are of a type which permit the mounting the Company's watt hour meter in combination with the cabinet so that by means of suitable adapters or end walls, all connecting wires are completely enclosed. Approved connection-blocks are of a type which permits disconnecting the meter for exchange or test without interruption to the customer's service. All necessary adapters or shutters will be furnished by the Company and installed with the watt hour meter.

3. Safety-cabinets and meter connection-blocks, which can be used interchangeably to a large extent, have been standardized and they are now obtainable from a number of different manufacturers. They comprise in the 30-ampere size.

(a) A combination fused service-switch and connection-block for single installations.

(b) A fused connection-block and cabinet for bank or single installation with separate service-switch.

Connection-blocks for installations of over 30 amperes are, as a rule, not available in combination with fuse blocks or service-switches.

5. For the mutual protection of customer and Company, all service and meter-cabinets will be kept sealed in order to accomplish the full safety features of the equipment. Consequently, when they are of a fused type, circuit fuses must also be provided on the load side of the meter which will be accessible to the customer. The fuses in the meter cabinet should be of a size determined by the capacity of the connection-block and should in all cases be heavier than the customer's fuses.

6. A card-holder must be provided on every meter loop fitting. The contractor must insert in this holder a card showing the complete address and the location in the building of the premises connected to the meter fitting.

7. Meter-loops or meter-fittings must be so arranged that the meters can be placed at least 6 inches away from iron cabinets and cut-out boxes, conduits, ceilings or walls, so as to permit the safe handling of wires during tests. On installations requiring 200 amperes, meters or larger this clearance must be 12 inches.

7a. The minimum distance between a floor and the bottom of the lowest meter-fitting must not be less than 2 feet.

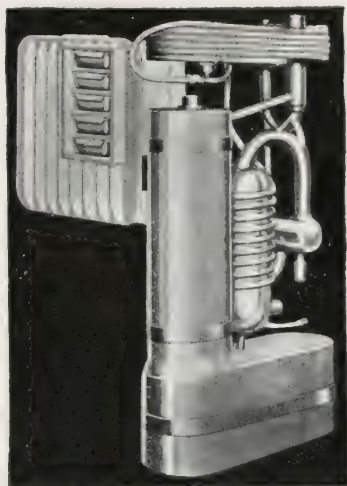
7b. On alternating current installations there must be 14 inches clearance, and on direct current installations 28 inches clearance, from the top of a meter-fitting to the bottom of the next one above or to the bottom of a cutout cabinet or any grounded surface. This distance must also be maintained between the top of a meter-fitting and a ceiling.

8. The distance between centers of meters of 50 amperes or less must not be less than 10 inches for A. C. and 15 inches for D. C. meters. Meters of a capacity in excess of 50 amperes must have a distance between centers of not less than 24 inches, and the leads of one meter must not run within 12 inches of another meter.

9. Service and house leads for type C. S. 2 and type C. S. 3 Thompson direct current meters, which are the types usually installed in size of 200 amperes and larger, must be carried in a metal trough to a point directly beneath the meter, and must be brought outside the trough through bushings spaced

ELECTROLUX

THE GAS REFRIGERATOR



THE ELECTROLUX
HERMETICALLY SEALED UNIT

←—————→
ELECTROLUX, THE SAFE AUTOMATIC
REFRIGERATOR. EVERYTHING IN ONE
SEALED UNIT WITH NO MOVING PARTS.
NOTHING TO WEAR OR TO GET OUT OF
ORDER. ELECTROLUX OFFERS THE
ULTIMATE IN REFRIGERATION.
←—————→

UTILITY APPLIANCE
CORPORATION

215 N. MICHIGAN AVENUE
CHICAGO



FOR SALE BY ALL LEADING GAS COMPANIES

far enough apart so that the loops may be run in a direct vertical line to the meter terminals. They must be so anchored that the weight of the cables will not rest on the meter terminals. The length of the meter loop required outside the trough is determined by the type of meters to be installed.

10. When external resistances, current or potential transformers are used in connection with meters, they must be located where they are accessible for inspection and can be removed without danger of making a short circuit.

11. Contact-making clocks for operating type P demand meters must not be installed within a loop formed by the cable leads nor close to conductors carrying heavy currents, as the magnetic field may affect their accuracy, nor should they be installed in any place subject to extreme changes in temperatures.

12. For the following 2-wire installations one side of the line is to be brought to the meter with a potential or neutral tap from the other side.

2-wire 115 volt D. C. meters.

2-wire 115 volt A. C. meters.

2-wire 230 volt D. C. meters (115 volt neutral tap).

2-wire 230 volt A. C. meters larger than 150 amperes.

13. In case of 115 volt meters the potential tap must be from the neutral wire.

14. Both outside wires and a neutral tap must be carried to the meter for all 2-wire 230-volt A. C. meters of 150 amperes and smaller; also for all 3-wire, 230-volt meters. For D. C. meters a potential tap from the neutral wire must be provided. * * *

15. For 3-phase meters, the 2-phase wires from the outside blades of the service switch and a potential tap from the third phase or middle blade of the service switch, must be brought to the meter, and where current transformers are used in connection with the meter, three potential wires are required, one for each phase.

16. Three-phase meters for 460 volts potential are installed only with current-transformers, and must be mounted on a slate or asbestos board panel. In addition to the potential wires, one for each phase, a special one-half voltage tap must be brought to the meter when it is necessary to operate a standard demand meter attachment. The service connection which is required for the one-half voltage tap must be arranged for with the Inspection Bureau of the Company before it is installed.

17. Potential taps for all meters must be so made that they cannot become disconnected. The connecting wire should be as short as possible, and must be run without a break and without a fuse between the house side of the service-switch and the meter-fitting. If the tap is broken in any place it must be soldered at point where the break connection is made.

Meter Fuse Protection.

1. All meters must be protected by suitable fuses of approved capacity. Meters must never be placed between the service and the service-switch.

Meter Board.

1. On installations where meter fittings are installed of less than 200 amperes capacity, a suitable meter-board of pine or other soft wood, not less than $\frac{1}{4}$ in. in thickness, or transite board (or equivalent), not less than $\frac{1}{2}$ in. in thickness, must be provided by the customer and fastened rigidly to the wall or other support. If transite board or

equivalent is used it must be so mounted that it will be accessible from the back of the board in order to permit a nut to be fastened to the machine bolt which is used for support of the meter. Where the meter-board is mounted on metal lath or other metal structure, all supporting screws or bolts must be countersunk. The dimensions of meter-boards and the location on them of meter-fittings of less than 200 amperes capacity, may be secured from the Commonwealth Edison Co.

Types and Dimensions.

1. Standard front-connected meters are provided for all alternating current installations. Current-transformers are used in connection with alternating current meters of a capacity in excess of 150 amperes. Current and potential transformers are required on all motor installations on primary lines.

2. Standard front-connected type of direct current meters are used up to a capacity of 150 amperes, 230 volts, 3-wire and 300 amperes, 230 volts, 2-wire. Meters of larger capacity, of either the front-connected or the back-connected switchboard type will be furnished.

Switchboard Meters.

1. Switchboard meters and their necessary equipment will be furnished by the Company for large installations if the customer makes arrangements with the Company in advance and provides for the necessary drilling and connections for both meters and their equipment. Demand meters, printometers, contact-making clocks, and relay switches are part of the meter equipment. Proper templates and wiring diagrams will be furnished by the Company.

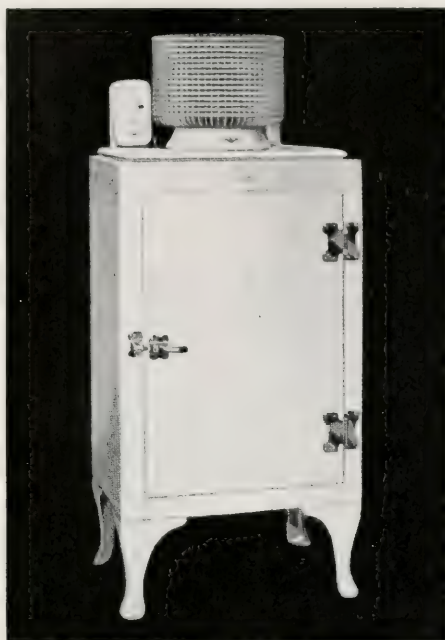
2. Test-links must be installed with all switchboard meters. For 2-wire meters, two test-links are required, one in the service lead to the meter, and one in the load lead from the meter. For the 3-wire meters, four test-links are required, one in each of the service leads to the meter, and one in each of the load leads from the meter. Test-links should be located on the front of the switchboard. The meter test-links approved may be secured from the Commonwealth Edison Co. The test-terminals, studs, and links of an approved type only will be accepted by the Company and must be furnished and installed by the customer.

3. In all cases test-links must be readily accessible and must be placed at a distance of not less than 2 inches from any switches, bus-bars, switchboard-frame, or frame bolts, so as to eliminate, as far as possible, danger from short circuits in making connections for tests.

4. When current-transformers or other metering equipment are mounted at the rear of the switchboard, there must be left a clear space of not less than 30 inches between such current carrying parts and the wall, to permit free access to this equipment.

5. The fuses provided for protection of printometer and other demand meters must be mounted so as to be accessible without the danger of the Company's representatives coming in contact with live parts of the switchboard while replacing these fuses.

6. Various details, such as the method of metering, the type and capacity of watt hour meters and maximum demand meters, and the size of test-links, will be determined by the Company for each switchboard installation. These details must be taken up with the Distribution Division of the Company by the customer or his representative before the board is designed and sufficiently in advance of its construction to give the Company



GENERAL ELECTRIC Refrigerator

The better architects and more progressive builders, after carefully considering all electric refrigerators, have chosen the General Electric.

They know that any product which is the result of fifteen years of research in the General Electric laboratories must be efficient in operation.

To get an idea of the wide range of models—the various sizes and finishes—just send for an Architect's Data Book. It gives complete specifications of these refrigerators which are developed, made and guaranteed by General Electric.

You may rely upon our hearty cooperation and close attention to detail

R. COOPER, JR., INC.

Distributor

120 SOUTH LA SALLE STREET

CHICAGO, ILLINOIS

TELEPHONE FRANKLIN 5720

sufficient time to obtain the special equipment. Blue-prints or sketches showing the proposed location and connections of meters and equipment on switchboards must also be submitted to the Distribution Division for approval, before the switchboard is constructed.

TAMPERING WITH METERS OR CLOSING METER LOOPS

1. All meters are sealed by the Company. The breaking of meter seals by unauthorized persons, tampering with the meters or cut-outs, or tampering with any wires or switches in connection with the meter wiring or the unauthorized closing of meter loops will not be permitted by the Company. Attention is called to Revised Statutes of Illinois, Chapter 38, Section 117, in force July 1, 1895. The penalty for the breaking of this law is a fine or imprisonment, or both.

LAMPS

1. The Company furnishes, without charge, to customers using lighting service under the Company's regular lighting schedule, one standard 60 watt Mazda lamp for each socket of the customer's installation. Special types of lamps, or lamps of other wattages will be furnished at an extra charge. Information regarding such extra charges may be secured at the Company's main office or at any of its lamp exchange stations. All lamps furnished by the Company, on either a free or an exchange price basis, remain the property of the Company, and the customer must pay the Company the regular merchandise sale prices for all broken or unaccounted for lamps. The Company, however, will not reimburse the customer for any part of the exchange price which he may have paid for lamps returned, unless the lamps have not been used.

2. The customer may at any time exchange lamps which have been furnished by the Company for lamps of other wattages or types, upon payment (if required), of the exchange price of the lamps desired, but when the lamps requested are 100 watts or larger in exchange for lamps of less wattage, such lamps will be furnished subject to an inspection by the Company, based on the rules of the Department of Gas and Electricity of Chicago with regard to the number of watts and lamps to be used on the circuits.

3. Lamps which are used for photographic printing, bath-cabinets, resistances, or any purpose other than illumination, are considered to be used for power purposes, and the installation and renewal of such lamps will not be made on the free or exchange basis.

4. Lamps which are used in places of extremely high temperatures or where they are subject to excessive vibration, or in places where the life of a lamp is materially reduced, will not be furnished on the free or exchange basis.

INSPECTION

1. All wiring which is to be connected with the Company's service must be inspected and approved by the Department of Gas and Electricity of the City of Chicago, and must conform to the rules and regulations established by the Company from time to time.

2. A temporary current-permit, or final certificate of inspection issued by the Department of Gas and Electricity of the City of Chicago must be presented at the office of the Company's Inspection Bureau before the electricity can be turned on. This applies to additional wiring which may be connected at any time, as well as to original installations. The Company reserves the right to make final connections of all wiring to its mains and, in case any damage results from unauthorized connections, the customer will be held responsible.

3. The Company furthermore reserves the right to discontinue service to the customer in case the Company deems the condition of the customer's wiring either hazardous or not in compliance with the Company's rules and regulations. The Company reserves the right to discontinue the customer's service on orders from the Department of Gas and Electricity of the City of Chicago when such a step is deemed necessary by that Department in order to secure compliance with the Electrical Code of Chicago.

4. Every electrical contractor is especially urged to stencil or provide a tag with his name, address and telephone number on the service or cutout-cabinet or meter-board.

This information will insure a closer cooperation between the Company and the contractor by enabling the Company to inform him quickly of any defects—with the result that the Company can render prompt and efficient service to both the contractor and the customer.

SPECIAL NOTICE

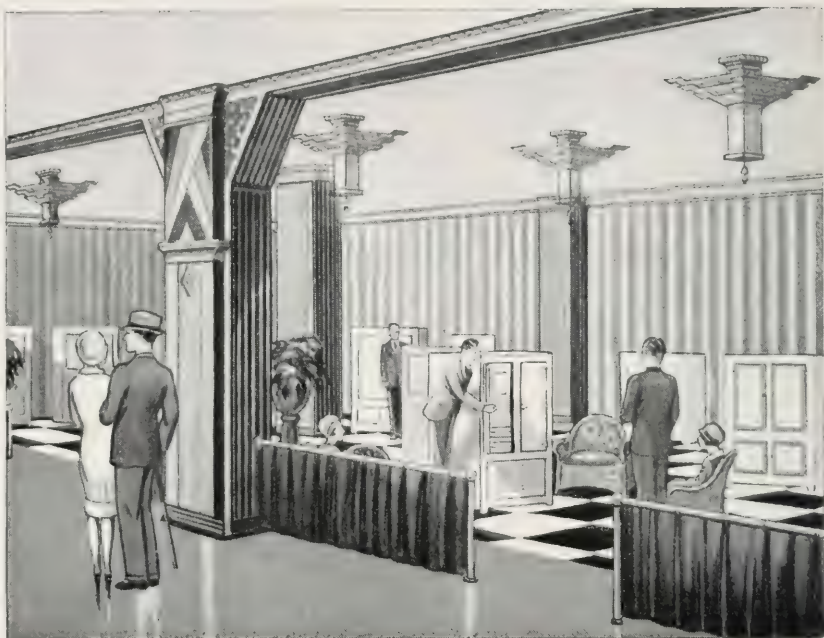
In view of the extension from time to time of alternating current lines into direct current territory, quite special attention should be paid to the manner in which cables on mains and sub-mains are installed in conduit.

In order to prevent prohibitive inductive effects, mains and sub-mains, conducting alternating current, should be placed in one conduit, when such mains or sub-mains comprise a circuit or a particular wiring system to any part of the building. This course should be pursued in case of direct current in order to obviate induction troubles when the change is made to alternating current at a later date.

It has been quite a common practice on installations where the larger size cables are involved to install them in separate conduits, and although this may be more economical on the original installation, it brings upon the owner a very heavy burden at a later date if the type of current is changed to alternating.

HEADQUARTERS FOR ELECTRIC REFRIGERATION

KELVINATOR-SERVEL-FRIGIDAIRE



HOUSEHOLD AND COMMERCIAL INSTALLATIONS

*Free Engineering Advice to Architects
and Builders*

CONTRACT DEPARTMENT

COMMONWEALTH EDISON COMPANY

72 WEST ADAMS STREET, CHICAGO

Room 1022

Randolph 1200, Local 155

MECHANICAL REFRIGERATION

By G. D. WETHERBEE, Refrigeration Engineer.

Domestic Mechanical Refrigeration is no longer a novelty to the average housewife and has become a necessity in modern homes.

Domestic Mechanical Refrigeration has been slowly developing since about 1910, but it is in the last five years that it has made the greatest strides and become a leading industry. The best available figures show that sales of electric refrigerators are increasing by leaps and bounds.

1924.....	24,000	machines sold
1925.....	75,000	machines sold
1926.....	248,000	machines sold
1927.....	265,000	machines sold
1928.....	375,000	machines sold

The advantages of Mechanical Refrigeration over the old ice-melting methods are outstanding:

Lower Temperature.—With ice, it is seldom possible to obtain less than 55° F. in the food compartments of average ice boxes even when the bunker is full of ice. With Mechanical Refrigeration, temperatures 10° to 15° lower are obtained. Bacteria development is nearly twice as rapid at 55° as at 45°, and perishable goods can, therefore, be stored twice as long without spoiling.

Uniform Temperature.—A mechanical chilling unit remains constantly of the same size. It does not melt or shrink. Uniform temperature is the result and is almost as important in food preservation as low temperature.

Dry Temperature.—Not only is the dampness of melting ice eliminated, but any moisture in the box is actually removed as frost on the chilling unit. Soggy crackers placed in a mechanical refrigerator over night may be removed the next morning dry and crisp. At a given temperature, bacteria development in dry air is much less rapid than in moist air.

Cleanliness.—There are only cold metal surfaces in a mechanical refrigerator. There is no opportunity for mold or slime to accumulate or for dirt or unhealthful foreign matter to be introduced into the refrigerator. All parts of modern mechanical refrigerators are easily accessible for cleaning.

No Ice Worries.—With a modern automatic mechanical refrigerator, there is no chance for an ice shortage, and worry about a week-end ice supply is obviated. Mechanical attention at long intervals must be expected, of course, but ice service every day or two is eliminated. Clean, constant cold is assured at all times and one may leave home for several days and expect cold sweet milk upon returning.

Ice for Table Use.—Clean, pure ice cubes of the proper size for a water glass are always available. They may be made of any water the user prefers. According to the size of the refrigerator, from 36 to 144 cubes weighing approximately a tenth of a pound each may be frozen in from 4 to 8 hours.

Frozen Delicacies.—The modern home may have all the frozen delicacies that are so much in demand during the hot summer months. Delicious sherbets, frappes, custards and mousses may be easily prepared. Recipe books may be obtained from all leading dealers and manufacturers. Some dealers have a free demonstration service to instruct users in the preparation of frozen dainties.

Economy of Operation.—With a given box, it costs less than half as much for electricity as for ice. It would cost even less for the same temperature as with ice. An average five cubic foot electric refrigerator may be expected to use between 30 and 60 kilowatt-hours a month according to location, usage and weather conditions. At three cents a kilowatt hour (which the new Chicago "room mate" makes possible) the cost of operation would be from \$0.90 to \$1.80 a month for such a box. At 60 cents a hundred pounds, ice for the same box would cost \$3.00 to \$6.00 a month if kept well filled at all times.

Gas heated refrigerators of the same size cost from \$0.65 to \$2.25 a month, according to usage, weather conditions, and the rates for gas and water.

This is the least part of the economy, however, as better food storage conditions eliminate food spoilage of at least \$1.00 a week even in small families. Some authorities place this figure at \$2.00 a week and correspondingly higher in large families. Ability to buy ahead when prices are right affect another great economy. Savings from the standpoint of health and sanitation cannot be calculated but must also be considered.

All These Appealing Benefits may be had at a cost well within the means of the average family. The modern family **cannot afford** to be without mechanical refrigeration. It is no longer a luxury; it is a necessity. The renting public is demanding Mechanical Refrigeration and few modern apartments do not include it. Owners of old buildings are also beginning to realize that the installation of Mechanical Refrigeration is an effective means of holding their tenants and stopping the movement to newer buildings.

HOW IT WORKS.

All electric refrigerating systems operate on the same principle; that a liquid in boiling or evaporating absorbs heat. The liquid must naturally boil at a very low temperature. The boiling (changing from a liquid to a gas) takes place in the **cooling coils**. As it boils, the gas is sucked from the coils and pumped to a high pressure by a **compressor** at this high pressure, and with the cooling effect of air or water circulating around the **condenser**, the gas becomes a liquid again and re-enters the cooling coils through a **pressure reducing valve**.

The **electric motor** does not do any cooling; it merely drives the compressor. Hence, refrigeration work of any kind is not an electrician's job as so many believe. Refrigeration installation and service is a specialized field entirely different from that of any other kind of machines or appliances.

Gas heated absorption machines operate on exactly the same general principle. In such equipment, the energy of the gas is directly applied without the use of a motor, and the refrigerant is compressed by driving it out of a solution with water by means of heat. Electricity may be used as the source of heat instead of gas, but at prevailing Chicago rates, the cost of operation would be considerably increased.

REFRIGERANTS.

All refrigerating devices use liquid chemicals with very low boiling points, and it is the boiling of these chemicals which removes the heat. Electricity (or fuel gas) is used only to re-liquify them after boiling; it does

Take



no chances

THE architect or builder who chooses Frigidaire takes no chances. Dependable operation at low cost is proved by the fact that more Frigidaires are used today than all other electric refrigerators combined. The Frigidaire line is complete. It includes household models with the Frigidaire Cold Control; Frigidaire

apartment house cabinets for single or multiple installations; commercial Frigidaires for stores and markets, for ice cream storage, water cooling, ice making and many other purposes; Frigidaire mechanical units for installation in good ice-boxes. Let our representative bring you complete information . . . now.

STOVER CO.

MICHIGAN AVE., at Randolph St., (151 N. Michigan Ave.)

PHONE RANDOLPH 4950

FRIGIDAIRE

The QUIET Automatic Refrigerator

not do the actual cooling. All chemicals or gases except pure air are poisonous to a more or less degree. If they are in sufficient quantity to be harmful, they should have a strong odor of irritant character to give warning of their presence.

Before the advent of small domestic machines, only ammonia and carbon dioxide were commonly used. For domestic use, carbon dioxide had too high a pressure and with ammonia, no copper or brass metals could be used. Therefore, sulphur dioxide (SO_2) was developed and later methyl chloride (CH_3Cl). The former is a strictly poisonous gas but has a characteristic powerful odor even in small concentrations. The latter is much less poisonous, but is practically odorless, and may be present in dangerous quantities without a person knowing it. When used in small self contained refrigerators containing less than five pounds, methyl chloride is strictly a harmless gas, and in such quantities, may be practically regarded as non-poisonous. Sulphur dioxide may cause quite a disturbance in case of a bad leak, but its warning properties are such that no person who is able to move could possibly be harmed by it.

Because of its high solubility in water, ammonia is the only refrigerant which may be used in gas heated absorption systems.

The efficiency of all refrigerants is almost equal regardless of their working pressures or boiling points.

COMPRESSORS

All electric refrigerating machines have a compressor, and a motor to drive it. Most of the standard makes have single acting reciprocating compressors with either one or two cylinders. Rotary compressors are being used by some manufacturers but they are not common.

Gas heated absorption machines have a "generator" which takes the place of the compressor.

CHILLING UNITS.

The two general forms of chilling units (lowsides) are **open coils**, and **tanks** with the coils submerged in brine or alcohol solution. The former gives quicker cooling and the latter more even temperature and longer "hold-over" in case of mechanical trouble. Chilling units are variously known as coils, tanks, boilers, units, etc. Some have the pressure reducing valves built into the chilling unit and some are separate.

PRESSURE REDUCING DEVICES

Three distinct methods are used to reduce the high pressure liquid from the condenser to the low pressure and corresponding low temperature of the cooling coils. All are being used successfully by leading manufacturers. First, automatic expansion valve, which maintains a predetermined pressure in the cooling coils. Second, high side float valve, whose function is to drain high pressure liquid from the condenser as fast as it forms. Third, lowsides float valve, which maintains a fixed liquid level in the cooling coils. The latter method is almost exclusively used in multiple installations.

AUTOMATIC CONTROL.

All modern electric refrigerators are started and stopped automatically and need no attention in this respect from the user. None of the standard makes are controlled directly by the temperature of the food compartment itself, however, but are set to maintain the chilling unit between certain limits (normally about 18°F.). Such a setting gives refrigerator temperatures of from 40°F. or lower in cool weather to about 50°F. in hot weather.

Two types of controls are in common use. First, thermostat control, where the motor circuit is opened and closed by an independent device according to the temperature of the chilling unit. Second, pressure control, where the pressure of the refrigerant itself (which varies directly according to the temperatures) operates the switch. The former seems to be the most direct and positive method. The latter requires no wiring beyond the machine itself and is almost universally used in the case of multiple installations.

TYPES OF REFRIGERATION INSTALLATIONS.

There are two general methods of installing mechanical refrigeration for the individual user. First, **self-contained refrigerators** with the machine built into the box, usually in the lower part. This method is particularly desirable where the equipment is owned by lessees of apartments as it can be readily moved from one place to another and put in operation by merely connecting it to a convenient wall socket. Second, **remote installations**, where the user already has a good ice box and needs only a machine and chilling unit. This method is desirable in private residences where portability is not important. With the machine in the basement, even the slight noise of modern machines is eliminated and the efficiency is increased by better ventilation and cooler air. Air-cooled machines are almost universal in the smaller sizes.

There are three general methods of installing mechanical refrigeration for apartment buildings, hotels, etc.

First, **brine circulation** or central plant with a large machine and brine tank in the basement from which brine is circulated through coils or special radiator sections in the various boxes. With this method, it is possible to confine all the refrigerant and mechanisms to the machine room, but all the connecting pipe lines must be insulated with molded cork covering or other material which, if not perfectly applied, may condense moisture from the air and cause wetness in the walls and floors. It is rarely necessary to enter the apartments for service purposes and only harmless brine circulates through the building and refrigerators. Brine circulation is the oldest method, but is being superseded by the methods described below.

Second, **multiple system** with machines in the basement, but with the refrigerant evaporated directly in the various boxes. Insulated pipe lines are unnecessary. It usually consists of two small copper tubings leading to each box, neither of which is cold. All noise is confined to the basement and mechanical service can be rendered without entering the apartment, except in the case of leaks or float valve trouble. The temperature of the different boxes cannot be separately regulated, however, and the owner of the building must bear all the operating expense.

Third, **self-contained refrigerators** with a separate small machine for each box. With this method, the refrigerator temperatures may be separately regulated, each tenant pays his own power bill, mechanical trouble affects only one box, boxes can be easily moved if necessary, and there is no possibility of a large amount of refrigerant leaking into one apartment.

REFRIGERATOR CABINETS.

Although wooden refrigerators are better than steel from the standpoint of heat leakage, they are rapidly being superseded by steel cabinets. The low temperatures obtained with electric refrigeration make it difficult to manufacture low priced wood cabinets which will not warp, crack and swell. A well designed, well built cabinet made of seasoned lumber with the paint scientifically applied is preferable in many ways to a steel

When your plans include ELECTRIC REFRIGERATION

remember that Kelvinator offers you a consulting service, backed by fifteen years of practical experience and that Kelvinator is endorsed by leading architects throughout the country.

Kelvinator introduced Electric Refrigeration for Domestic use in the year 1914 and has consistently improved its product and also its knowledge of refrigeration problems by pioneering in practically every major development adding convenience and dependability to this modern necessity.

The benefit of this experience is available to architects, through Kelvinator Branch Offices and Distributors in every important center.

KELVINATOR SALES CORPORATION

Detroit, Michigan

Write for new Architect's Catalog showing new line.

one. For the same price, however, modern steel boxes are usually more satisfactory than wooden ones. In the best refrigerators, the steel is lead coated to prevent rusting. The door frames should never be metal as it conducts heat too well. There should be no metal to metal contact any place between the interior and exterior shells.

Cork board is the standard insulation at present. Its heat conductivity is not much lower than other good insulating materials, but its advantage for cold storage purposes is that it is less affected by moisture or condensation than other materials. In the best boxes, it is carefully fitted with as few joints as possible, and all surfaces and cracks are poured with hot asphalt to make an air tight shell. In cheap boxes, the cork slabs are merely laid in the wall with no attempt at sealing the joints.

Mineral wool, when dry, is almost as good an insulation as cork board, but unless thoroughly waterproofed, it becomes damp and loses this property to a great extent. Mineral wool is made of rock, finely blown, and will therefore never rot or deteriorate. It is also strictly fire and vermin proof. If properly applied, it is an excellent insulating material.

Many other materials and combinations of materials are used for refrigerator insulation including balsam wool, granulated cork, many fiber compounds, and insulating paper. Many of them seem to be entirely satisfactory.

Insulation is applied in thicknesses of from one inch in cheap cabinets to three inches in the best. Two inches in the sides and top and three inches on the bottom is common for a medium size domestic refrigerator.

The interior of the best modern boxes is porcelain fused on a seamless steel lining with rounded corners. There are no joints or seams except where it is fastened to the front frame. Cheaper boxes have painted interiors of galvanized iron. The exterior of most cabinets is two or three coats of lacquer applied over the proper base coats, although some fused porcelain boxes are being sold.

The modern tendency is to eliminate all panels in the doors and sides of the cabinets, to remove as much trimming and metal work as possible, and produce a flat, smooth exterior which may be easily cleaned. There is some demand for colored boxes to harmonize with kitchen color schemes.

Domestic electric refrigerators are made in sizes ranging from three and a half to fifteen cubic feet food storage capacity. More than half of all those in use are approximately five cubic feet. Most families do not purchase refrigerators large enough for their purposes.

UPKEEP AND ATTENTION.

The motor of most electric refrigerators needs occasional oiling. This should be done regularly by the user. The compressor oil need be changed only at long intervals, sometimes never within the life of the machine.

When the frost becomes too heavy on the chilling unit, it must be removed by turning the machine off until all the frost melts. Care should be taken to empty the pan provided for this purpose unless the drain is connected to a sewer. Two weeks is the average time for defrosting, although it varies greatly according to how the box is used. A rough rule is to defrost when the frost is as thick as one's finger. Slow or rapid frost formation has nothing to do with the mechanism; it comes only from moisture in the air or from foods in the refrigerator. Warm dishes should never be placed in the box and liquids should be kept covered. The door should be opened as seldom as possible.

Being a piece of machinery, mechanical attention must be expected at intervals. There is no mechanical refrigerator which will

"never give any trouble." Most faults become apparent soon after installation and the dealer should rectify such faults promptly and capably. Therefore, it is of the utmost importance in purchasing a mechanical refrigerator to consider the dealer, his reputation, his reliability, his permanence, and his service organization rather than mechanical features, refrigerants, etc., which are all good if handled properly. A mechanical refrigerator is no better than the dealer behind it.

BUYING AN ELECTRIC REFRIGERATOR.

In buying a mechanical refrigerator, the points to be considered are as follows in the order given:

1. Dealer.
2. Mechanical reliability.
3. Convenience.
4. Noise.
5. Appearance.
6. Manufacturer.
7. Efficiency.
8. Price.

REFRIGERATION FOR COMMERCIAL PURPOSES.


Along with the popularity of domestic mechanical refrigeration, there is a demand for larger machines capable of supplying the requirements of larger residences, clubs, hotels, restaurants, grocery stores, florists, and small butcher shops. Manufacturers of domestic equipment have met this demand with machines of 300, 500, 750, 1,000 pounds ice melting capacity (per 24 hours) usually driven by 1-3, 1-2, 3-4, 1 horsepower motors, respectively. The latter size is capable of maintaining a 40° F. temperature in a well insulated refrigerator up to 8'-0"x10'-0"x11'-0" outside dimensions without excessive operation.

While the original cost may seem high, the economy of mechanical refrigeration is also great. In many instances, power bills of fifteen dollars a month replace ice bills of thirty or forty dollars. Refrigerator depreciation is reduced, produce losses are reduced to a minimum, and the dealer is able to deliver better quality products to his customers than with older methods. Mechanically cooled display cases are invaluable as silent salesmen.

These larger sized machines may be obtained either water cooled or air cooled, but unless the machine location is cool and well ventilated, the latter are preferable. A one horsepower machine uses only 40 or 50 gallons of water an hour during actual operation and an automatic valve shuts the water off when the machine stops. High pressure cut-outs and other necessary safety devices are usually included.

Where there are two or more separate refrigerators in one store or restaurant, the modern method is a separate machine for each one instead of using one large machine to cool them all. In this way, separate temperature control for each refrigerator is possible, one box may be shut off or defrosted without affecting the others, and cold losses from long covered pipe lines are eliminated. It is especially important that a water cooler, ice cream cabinet, or other special fixture has its own separate machine.

Machines for the commercial field of mechanical refrigeration are now developed to a high degree of efficiency and reliability and their adaptation to the many types of commercial fixtures is almost unlimited. In almost every case where cold is required, mechanical refrigeration can do it better. The greatest fault in this field has been the use of machines too small for the work, due to price competition. In purchasing such equipment, the public is cautioned to compare prices only after comparing the size of the machine and cooling coils; also to buy from dealers in a position to fulfill their guarantee.



Modern living conditions demand the utmost in domestic convenience. Gas appliances are compact, attractive and efficient, make no dirt, and allow full use of the basement.

Auxiliary Heating
House Heating
Water Heating
Refrigeration
Cooking



Call Architects and Builders Service Division of the Gas Company for full information about FREE planning and architectural service and special prices of gas appliances in quantity purchases.

Call WABash 6000

The Peoples Gas Light and Coke Company

GAS FITTERS' RULES

Of the Peoples Gas, Light and Coke Company

OFFICE BUILDINGS, DWELLING HOUSES AND FLATS
MANUFACTURED GAS FOR LIGHT

INDEX TO RULES

	RULES		RULES
Appliances, connecting	15	Pipe, maximum feet allowed for stores, factories, hotels and restaurants for given equivalents	31
" equivalents	24	" single system	18
" " City Ordinance relative water heaters	25	" size and equivalents	24
" size of pipe for industrial	27	Piping, breaking size	13
" size of pipe and equivalents	24	" grade	12
Automatic water heaters	26	" imbedded in concrete or cement	11
Building Services, bringing to street service	57	" inspection	1
" " encasing	45	" laundry room	34
" " equivalents, maximum feet allowed	32	" exit lights in theatres, schools, etc.	37
" " size, when consumption is unknown	39	" masonry wall	10
" " flat or residence	40	" master meter	5
" " header	48	" obstruction in	4
" " location	43	" outside wall	9
" " opening	46	" size for industrial appliances	27
" " outlets	38	" sketch showing plan for apartment or residence	21 and 22
" " solid wall porch	42	" testing	2
" " store, factory, or garage	41	Rules, understanding	19
" " test pipe	47	Risers, electric cut-off box	36
" " terminating	58	" height	23
" " wrapping	44	" location	21
Drops from branch lines	14	" location, where not to locate	22
Electric cut-off box	36	" theaters	33
Equivalents, maximum feet allowed for pipe of various sizes	31	" vestibule partitions	35
" " maximum feet allowed for pipe of various sizes	30	" size for combined lines	29
" " and size of pipe required	24	Services, bringing building services to street	57
General instructions		" apartment buildings	50
Grade pipe, how to	12	" building	39
Material, defective	6	" " corner	52
" not allowed	7	" " court	51
Meters, location	20, 21	" " in rear of corner lot	53
" location prohibited	22	" " " lot	54
" master, piping	5	" stores	49
" resetting or changing location	60	" maximum feet allowed for given equivalents	32
" shut off on fuel run supplied by master	16	" lents	56
Openings, size	28	" opening in floor	55
Outlets, capping	8	" opening in wall	16
" distance from ceiling, wall or floor	38	Shut-offs on fuel run supplied by master meter	47
Pipe, maximum feet allowed for building service for given equivalents	32	Test-pipe, for building service	17
" maximum feet allowed for office buildings, schools, hospitals, residences and apartments for given equivalents	30	Type-setting machine	3
		Valve, back pressure	35
		Vestibule, partition	31
		Water heaters, automatic	26
		" types and their equivalents	59
		Work reserved	

GENERAL INSTRUCTIONS.

1. Inspection of Piping.

Piping must be inspected by the Gas Company after it is completed and before the interior of the building is lathed or covered.

Twenty-four hours notice will be required for each inspection. Gas fitters must have the work completed and the piping tight before they notify the Gas Company to make inspection.

2. Testing.

Before fixtures are installed, the piping must stand a pressure of 6 inches on a column of mercury without showing any drop in the column for a period of ten minutes.

After fixtures are installed piping must stand a pressure of one inch on a column of mercury without showing any drop for the same period of time.

3. Back Pressure Valve.

When compressed air, oxygen or any other mixture under pressure is used with gas, an approved safety back pressure device must be placed on piping to prevent pressure backing up into meter.

4. Obstructions in Pipe.

All piping must be free from burrs and other obstructions.

5. Piping for a Master Meter.

Pipe run for flats where a master meter is to be set will be installed in the same manner as is done for a single flat.

One riser only is required, and each apartment connected in to this one riser on the different floors.

It is not required that each apartment have a separate riser.

6. Defective Material.

Split pipe or fittings must be removed and in no case repaired with cement, lead or caulked.

7. Material Not Allowed.

Unions or bushings must not be used in work that is to be concealed, and cast iron fittings are prohibited in either exposed or concealed work.



3240 Sheridan Road,
Chicago, equipped with
Universal Gas Ranges.
McNally & Quinn, Ar-
chitects and Engineers.

Where Quality Counts, Universal gets the Choice

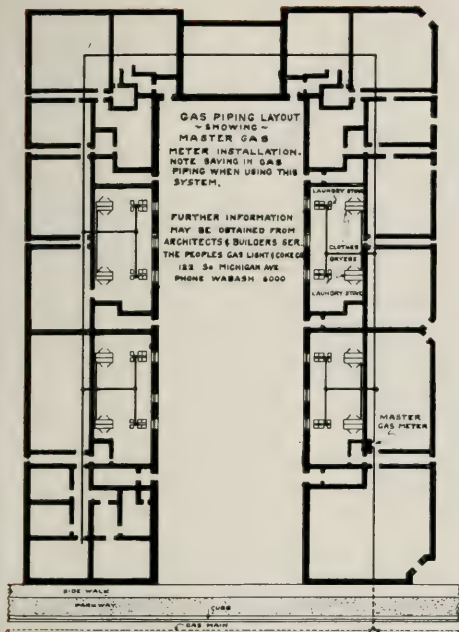


UNIVERSAL IN-A-DRAWER BROILER GAS RANGES are outstanding for their quality of construction, beauty and service conveniences, embodying every modern improvement in addition to the exclusive advantages of the In-A-Drawer Broiler—a safe, practical and usable broiler.

Centrally located in Chicago, we are ideally situated to most efficiently and economically serve the Chicago building trade.

CRIBBEN & SEXTON COMPANY

700 North Sacramento Boulevard
CHICAGO, ILLINOIS



8. Capping Outlets.

All outlets must be securely closed with iron caps until fixtures or appliances are installed.

9. Piping on Outside Wall.

When it is absolutely necessary to run pipe on an outside wall a furring strip must be placed between the pipe and the wall.

10. Piping on Masonry Walls.

All piping run on masonry wall must be furred out and must be securely fastened thereto by strapping it to wooden plugs driven into the wall.

11. Imbedding in Concrete or Cement.

When pipe is to be imbedded in concrete or cement, it must be covered with tar paper or other suitable covering, or laid in a conduit pipe.

12. Trapping Pipe.

To avoid trapping pipe, gas fitters must grade the pipe to riser or to drops.

13. Breaking Sizes.

In every case when an extension is to be made, pipe must be broken at a point where the full size can be maintained. No extension must be made from a pipe of a smaller size.

14. Drops from Branch Lines.

Drops on branch lines should have a set of 4 inches and they must be dropped square. Outlets for side brackets may be either square bends or long drop ells. The use of nipples is prohibited.

15. Connecting Appliances.

Fitters are particularly requested to see that gas burning appliances are connected solid with iron pipe, with the exception of portable appliances which may be connected by approved metallic tubing.

16. Shut Offs on Fuel Runs—Master Meters Supplying.

A shut off must be installed in the apartment to be supplied, at the appliance, on

every fuel run where a master meter is to be used.

This permits control of gas in each apartment without shutting off the master meter.

17. Typesetting Machines.

A linotype or monotype machine must be supplied by a separate fuel run.

RULES AND TABLES FOR PIPING.

18. Single Pipe System.

The following tables and rules provide for a single pipe system in either new or old buildings. However, should it be more economical to install a double pipe system, such may be installed, and outlets computed on the same basis as that for a single pipe system.

19. Understanding Rules.

If, in any instance, the rules governing the sizes of pipe to be installed are not clearly understood, or if unusual conditions not covered by the rules are met with, the Gas Company should be consulted.

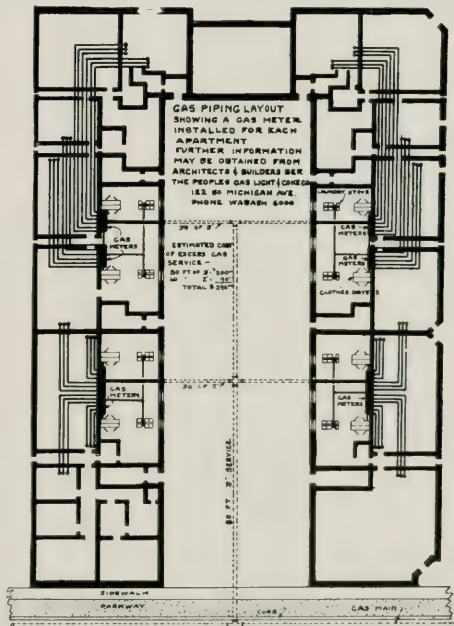
20. Location of Meter.

The Company reserves the right to determine in all cases the location for the meter.

21. Locations for Risers and Meters.

All risers must be located to conform with the following requirements:

All meters hereafter installed on consumers' premises must be located in the basement, or on the first floor as near as possible to the service entrance in a clean, dry, safe place not subject to wide variation in temperature. No meter hereafter installed



shall be placed in coal or wood bins, on the partition forming such bins, or in any location where accuracy may be affected by exposure to the elements.

22. The Following Locations Are Specifically Prohibited.

Under a bulkhead or show window, attic, sitting room, bed room, bath room, closet, stairway closet, over a door or window, under a sink or wash stand, over a gas or electric light fixture or in any location where the visits of the meter reader will cause annoyance to the customer.



The Better Gas Range

WITH a complete line of models for every cooking and baking need—providing the utmost in efficiency, economy and all-round kitchen comfort—Crown Ranges commend themselves to architects in the planning of homes, apartments, hotels, etc.

Specifying Crown is an assurance of getting a range of distinctive design, beauty of appearance and utility. That is why Crown has established a reputation as "The Better Gas Range." Housewives everywhere have found it to be just that.

Whichever model you specify, you may be sure of getting the same high standards of quality in material and workmanship that have given Crown its enviable standing in the field through more than 29 years of manufacturing experience.



Downtown Office
236 East Erie Street
Tel. Superior 9506

West Side Office
5851 W. Madison St.
Phone Mansfield 8520

North Side Office
5908 Ridge Ave.
Tel. Longbeach 7975

GENERAL OFFICE AND FACTORY
4631 W. 12th Place
Phones Lawndale 0311-0312

South Side Office
6645 S. Halsted St.
Tel. Englewood 2650

Meters shall not be set so close to any source of artificial heat as to subject them to a temperature exceeding 75 degrees Fahrenheit. On all new installations a meter must be installed in a location where a temperature no lower than 40 degrees Fahrenheit is maintained.

23. Height of Risers.

Risers for stores and factories must not be more than nine feet from the floor, or of sufficient height so that the bottom of meter will not be closer than 6 inches from the floor.

No riser must be placed in a basement less than 6 feet in height.

Risers in a residence or flat building must be placed as near the ceiling as possible but must extend 2 inches below the ceiling. If meters are to be double decked, no riser must be lower than 3 feet from the floor, so that the bottom of the meter will not be closer than 6 inches from the floor.

24. Size of Pipe Required and Equivalents.

Ten cubic feet of gas will be considered as an equivalent. In order to obtain the size of pipe required to supply one or more appliances, table on appliances must be consulted and the total number of equivalents allowed the appliance, will be used to determine the sizes and length of pipe to be run as shown in the tables for piping.

Where equivalents desired are in excess of equivalents shown in piping tables, the next larger size pipe must be used.

Appliance	Equivalents Allowed
Domestic Ranges	10
Water Heaters	6
Radiantfires, Radiators	4
Space Heaters	4
Laundry Stoves	3
Light openings, such as in Kitchens and bathrooms	1
Washing Machines	3
Ironing Machines	4
Clothes Dryers	4
Incinerators	3
Ice Machines, Style "A"	5
" " Style "B"	9
" " Style "C"	12

NOTE: The above is a list of appliances commonly used in residences and apartment buildings together with the allowable equivalents for each appliance.

25. Domestic Type of Storage and Tank Water Heaters.

The City ordinance pertaining to the installation of water heaters, which is as follows, must be observed:

CITY ORDINANCE.

"1902. Permit Required to Install or Connect Gas Water Heaters.

"No person, firm or corporation shall install or connect any hot water heater in any building or structure, for heating water in the same by the use of natural or artificial gas as fuel, within the City of Chicago, without first having obtained a permit as hereinafter provided.

"1903. Application—Permit—Fee.

"Any person, firm or corporation desiring to install or connect any water heater in a building or structure for heating water for use in such building or structure by the use of natural or artificial gas as fuel, shall file with the Commissioner of Health of the City of Chicago, an application upon form furnished by the Department of Health, containing the name of the applicant, the street number of the building in which the said heater is to be used (and if the building is an apartment building, the location of the apartment) the floor plan of the room, showing the proposed position of the heater, the location of the plumbing fixtures, the door and window openings, showing their dimen-

sions and the course of the gas duct or ventilating pipe to the outer air or to a chimney connection provided, however, that no such gas water heater shall be installed in any bathroom or toilet room.

"If such application is approved by the Commissioner of Health, it shall be the duty of the City Clerk to issue a permit to the applicant upon the payment by him of a fee of one dollar for every non-automatic heater and three dollars for every automatic heater desired to be installed or connected.

"1904. Structural Requirements. No person, firm or corporation shall install or connect any such heater unless it be provided with a metallic hood to which there shall be connected a suitable ventilating pipe not less than two inches in diameter, which said pipe shall extend to a chimney flue or to the open air in such a way as to carry off all escaping gases or fumes from such heater. In case such ventilating pipe shall not extend to the open air, it shall be provided with a cap or cowl so as to prevent a back draft. Every such heater or gas oven shall be provided with a convenient and adequate means of access to the burners and heating surfaces for the purpose of lighting and cleaning same. No such gas water heater shall be set closer to the floor than twenty inches, measuring from the top of burner.

"1904 a. Automatic Instantaneous Gas Water Heaters. All instantaneous gas water heaters, automatically controlled by pressure valve and thermostat, shall conform to the foregoing structural requirements, except that they may have pilot lights located entirely within the casing and arranged for continuous burning, and that they may set with top of burners not less than eight inches above floor; provided, that every such heater shall be set on a non-combustible floor or a sheet metal mat or pan and that the walls behind shall be protected by a sheet metal covering to the height of the heater.

"1905. Duty of Owner or Person in Possession of Heater. It shall be the duty of the owner or person in possession or control of any building or structure where gas water heaters have heretofore been installed to make such heaters comply with the requirements of this article, and it shall be unlawful for any person to use any such heater until it shall have been made to conform to the provisions of this article.

"Section 2. This ordinance shall take effect and be in force from and after its passage and due publication."

26. Automatic Water Heaters.

To obtain size of pipe required to connect automatic water heaters, consult Table of Appliances for equivalents and obtain size and length of pipe required as is shown in Table No. 30.

The following types of heaters may be taken from existing piping provided it is of sufficient size to supply appliances already connected in addition to heater.

Where existing piping is not of sufficient size to supply water heater, the table of piping should be consulted and a separate run installed for the heater.

Name	Type	Equivalents
Rex	24, # 34	6
"	42	6
Premier	0, # 1	6
"	2, # 3	6
Everhot	All Types	6
Kompak	18	6
"	32	6
Lovekin	22, # 28	6
"	35, # 45, # 60	6
Humphrey	24	6
"	40	6
Ruud	20, # 30	6
"	40	6
Lion	20	6
"	30	6



The Sheridan Grace Apartments, Chicago, equipped throughout with Lupton Steel Casement Windows and Heavy Casement Doors. B. Leo Steit, Architect. Avery Brundage Co., Contractors.

Many of the finest new office buildings, hotels, banks, clubs, hospitals and apartments under construction at the present time are equipped with Lupton Steel Windows in one or another of their many perfected forms.

The Sheridan Grace Apartments, one of the outstanding new apartment buildings of Chicago used 2,279 units of Lupton Standard Residence Casements, 63 units of Special Residence Casements, 30 pairs of Heavy Casement Doors and 2 Pivoted Factory Windows.

Lupton makes approved steel windows for every type of building and also renders a thorough-going engineering and erection service. Always consult Lupton on Windows.

David Lupton's Sons Company, 333 North Michigan Ave., Chicago

Lupton  **Windows**

The following types of heaters will require a separate fuel-run from the meter to the appliance.

To determine the size of pipe to be used, consult table in rule 29.

Name	Type	Equivalents
Hoffman	2 1/2 D	16
"	3 H	26
"	4 H	26
"	6 H	44
"	8 H	64
Rex	66	16
Premier	4	16
Toombs	3	26
"	4	26
Radke	2 1/2	16
"	3	26
"	4	26
"	6	44
Humphrey	66	16
"	2 C	26
"	4 C	44
"	6 C	44
"	8 C	64
Ruud	85	16
"	95	16
"	3	26
"	4	26
"	6	44
"	8	64
"	50	16
"	100	16
"	200	26
"	300	44
"	500	64
Pittsburgh	50	16
"	55	16
"	60	16
"	65	26
"	2	16
"	4	26
"	6	44
"	8	64
Go. Ro.	3	26
"	4	26
"	6	44
American	3	26
"	4	26
"	6	44
Bryant	3 A 2	16
"	3 A 3	26
"	4 A 2	16
"	4 A 3	44
"	5 A 3	44
"	6 A 3	64
"	7 A 3	64
"	8 A 3	64
"	9 A 3	102
Humphrey	20	16
"	30	26
"	25 A	26
"	2 A	26
"	3 A	26
"	4 A	26
"	6 A	44
"	8 A	64

27. Interior Piping for Industrial Appliances.

Due to the many different types of Industrial Appliances and their wide variation of capacity, a table is not easily shown. It is therefore advised that where appliances are to be used for industrial purposes, such as candy furnaces, water stills, soft metal furnaces, japanning ovens, heat treating furnaces, forges, brass melting furnaces, etc., that the Industrial Department be consulted before piping is installed.

28. Size of Opening.

To determine the size of the opening required when risers are connected at the meter end, the combined loads of the risers must be added together. (See table in rule No. 30.)

29. Size of Riser for Combined Lines.

When two or more lines of pipe are connected in order to be supplied by one riser, the riser must be of sufficient size to supply the combined load of all the lines. (See table of Equivalents.)

30. Office Buildings, Schools, Hospitals, Residences and Apartments.

Size of Pipe	Feet of Pipe Allowed	Number of 3/4" Equivalents All'd
3/8"	30	4
1/2"	50	6
3/4"	60	16
1"	100	26
1 1/4"	125	44
1 1/2"	150	64
2"	200	102
2 1/2"	250	160
3"	300	240
4"	400	450

In piping for lighting, each 3/4 inch opening will be considered as one equivalent.

No fuel run to a range or combination of appliances other than a laundry stove must be less than 3/4 inch pipe. 1/2 inch pipe is allowed for laundry stove runs, only where direct extension is from meter.

It is permitted under the rules, in addition to what equivalents are allowed, to take off a 3/4 inch pipe, one light opening in a kitchen or bathroom, and a laundry stove. No other additional combination is allowed on this size of pipe.

In planning piping, cross reference to determine the number of equivalents must be made to table showing equivalents allowed for various appliances.

Fifteen feet of 1/2 inch as shown in sketches on pages 21 and 22 is allowed for laundry stoves, radiators, radiators, etc.

No opening less than 3/4 inch is allowed for a range as shown in tables for piping.

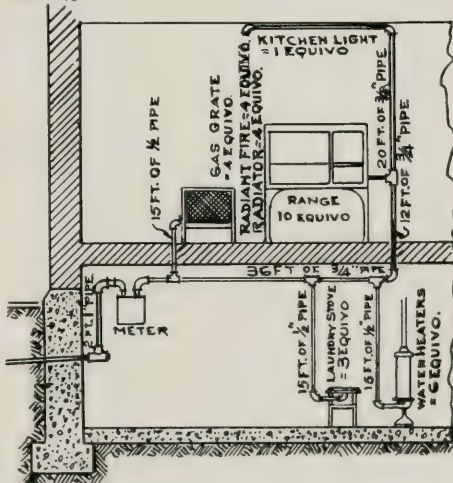
31. Stores, Factories, Hotel and Restaurant.

Size of Pipe	Feet of Pipe Allowed	Number of 3/4" Equivalents All'd.
3/4"	60	16
1"	60	33
1 1/4"	80	60
1 1/2"	120	76

When installing piping for Hotel and Restaurant appliances, the rule of pipe sizes and consumption table of appliances will be observed where piping not larger than 1 1/2 inches is required. Where large appliances are to be installed requiring piping of a larger size than 1 1/2 inch, the Hotel and Restaurant Department should be consulted.

Thirty feet of 1/2 inch pipe for branches will be allowed off of any one opening.

No running line for stores must be less than 3/4 inch.



Sketch showing piping plan for apartment or residence when heating appliances, range, water heater, laundry stove and kitchen light are to be used; also showing ten feet of one inch pipe to first opening.

Fenestra

SOLID STEEL WINDOWS



Fenestra office windows are especially designed for use in the beautiful, efficient, and comfortable homes of American business.

The narrow steel frames admit a flood of daylight. Made of solid, rolled steel bars, they never warp, swell, shrink, stick or rattle. They can be opened easily in any weather, or closed tight with wide flat overlaps and double internal baffles to meet the pressure of high winds.

Because they can be washed with ease from inside the building, they represent a real economy, not only in the construction but also in the maintenance of the building itself. A benefit to the architect, to the owners, and to the building manager.

The Fenestra Architectural Service Department will be glad to make detailed suggestions and layouts, a free service cheerfully rendered without cost or obligation.

You can now specify Fenestra steel casements—and screens—the complete window, all made by one manufacturer. From the viewpoint of the architect, this is the greatest improvement since the inception of steel windows.

The metal screens are built to fit flat against the inside of the casement frame, a part of the window itself. The hardware operates through the screen from the inside—to open or close the swing leaves on the outside. Screens need never be touched, but can be removed or replaced in a minute, without the use of tools of any kind.

The wide variety of types and sizes of the casement windows permits the architect to form almost endless interesting groupings. They add to the value of the home or the apartment building, and can be used with any architectural design or any type of material.



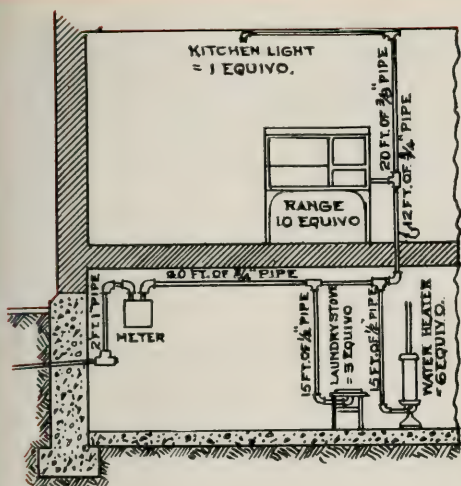
DETROIT STEEL PRODUCTS CO.

CHICAGO, ILL.

GEO. P. CLAYSON, Manager

1017 Conway Building

Franklin 7214



Sketch showing piping plan for apartment or residence when range, water heater, laundry stove and kitchen light are to be used.

This is the maximum of appliances allowed to be taken from a $\frac{3}{4}$ inch line.

A store having a width of more than 30 feet (such as a double store) must have a running line of not less than 1 inch in size.

32. Building Services.

Size of Pipe	Feet of Pipe Allowed	Number of $\frac{3}{8}$ " Equivalents All'd.
1 "	70	20
1 $\frac{1}{4}$ "	90	40
1 $\frac{1}{2}$ "	110	70
2 "	150	120
2 $\frac{1}{2}$ "	200	180
3 "	250	300
4 "	350	550

NOTE: All openings in a building service must be of the same size as that of the riser, which in no case must be less than $\frac{3}{4}$ inch in size.

This rule will permit of running different sizes of pipe as building services, provided the consumption corresponding to the smallest size of pipe in the run is used.

No building service for stores must be less than $\frac{1}{4}$ inch in size.

33. Riser for Theatre.

A meter to supply a theatre may be set in a public meter room with other meters and may be supplied by the service supplying those meters.

34. Piping for Laundry Room.

In a flat building where appliances such as laundry stoves, driers, etc., are installed for the joint use of tenants, a pipe from each tenant's meter must be run to the laundry room, and a header provided on the wall adjacent to the appliance. Each riser must be equipped with a lock cock.

A metal tag with the flat number plainly marked thereon must be securely fastened to each cock.

One outlet for a light in the laundry may be taken from the end of the laundry header.

35. Vestibule Partition.

A riser must not be run closer than one foot to a vestibule partition.

36. Electric Cut Off Box.

A riser must never be run to a point nearer than 5 feet from an electric cut off box.

37. Exit Lights.

When running pipe for exit lights in theatres, schools, amusement or assembly halls, it must be done in accordance with the city ordinance.

38. Outlets—Distance from Ceiling Wall or Floor.

If the pipe has been run under the floor, the outlet for fuel in a kitchen must be left 3 inches above the floor and two inches clear of the baseboard. If the pipe has to be run overhead and down, the outlet must be left 3 feet from the floor and 2 inches clear of the finished wall.

Wall or ceiling outlets must be produced $1\frac{1}{2}$ inches below an unfinished ceiling, or $\frac{5}{8}$ inch below a finished one. In a store the outlets must be produced $2\frac{1}{4}$ inches below an unfinished ceiling, and $1\frac{1}{2}$ inches below a finished one.

An outlet for a mantel or fireplace must be produced $\frac{1}{2}$ inch above the finished bottom of the fireplace, 6 inches from the left or right hand side, and 6 inches from the back.

39. Building Service Only.

In figuring for building service only for buildings where consumption is not known, the following rule will allow for a building service of sufficient size to meet ordinary requirements.

Should an owner contemplate using gas for industrial purposes, the Industrial Department must be consulted for size of pipe.

Allow two cubic feet of gas for each 10 square feet of floor space on each floor, then consult table in rule No. 32 for number of equivalents which will determine size of openings for each floor, repeat this rule for all floors.

Add total consumption for all floors which will determine the size of pipe, starting at street service, then reduce size of pipe as openings are taken off to comply with tables of piping for length, etc.

If the number of equivalents figured for the building comes between any two number of equivalents as shown in table No. 30, always use the larger number of equivalents which will determine the proper size of pipe to run.

40. Building Service in Flat or Residence.

A building service for flat building or a residence must be run over-head and brought down in an inside partition not less than 4 feet from an outside wall.

No building service must be run under a basement floor or under a first floor where there is no basement.

41. Building Service in Store, Factory, and Garage.

A building service in a store may be run over-head if the entire horizontal run of pipe can be graded to the street service. If not, it must be run under the floor and graded to street service.

When a building service is run over-head it must be brought down at least 4 feet from the front wall of the building.

When it is necessary to extend a building service underground from the front to the rear of a store or factory building, it must be encased in tile pipe with cemented joints.

Gas fitters must not do any underground piping outside of a building.

42. Solid Wall Porch.

In a building with a solid wall porch, the building service must be run to the front and then to the side wall.

43. Location of Building Service.

When risers are located in the rear of a basement or in a room provided for that pur-

VOIGTMANN & COMPANY

2543 West 22nd Street

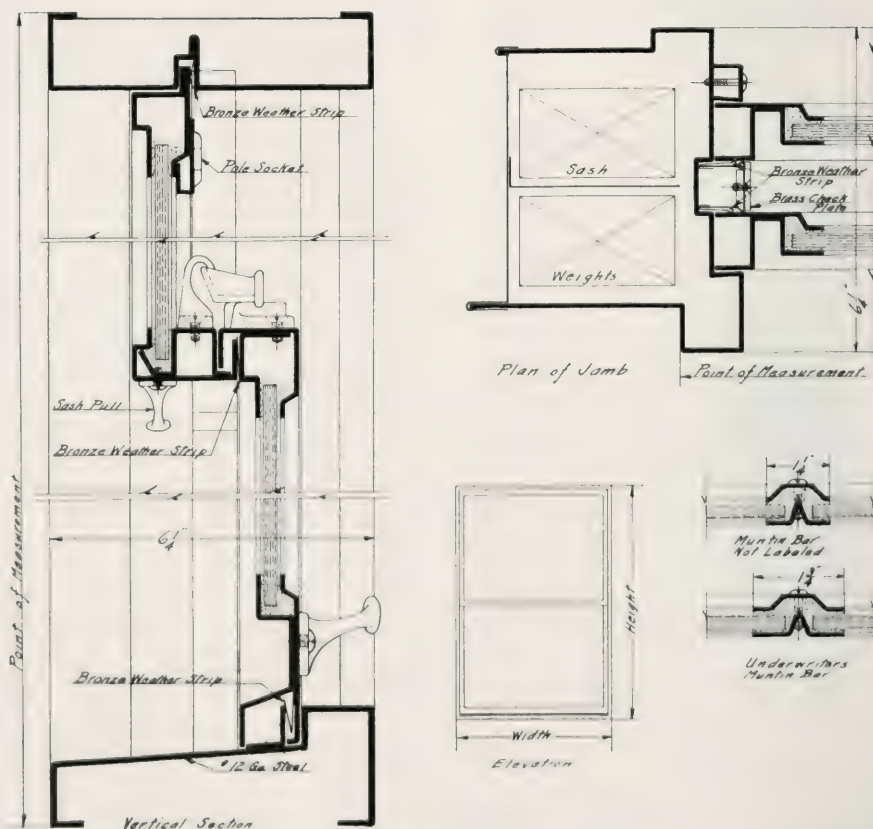
At Rockwell

Telephone, Lawndale 8240-8241-8242

CHICAGO, ILL.

Pioneer manufacturers of metal windows, offer a **HEAVY GAUGE** window of superior design which can be furnished in No. 14 gauge hot galvanized steel for frames and sash with a No. 12 gauge sill. This window can also be furnished in Aluminum or Bronze of equivalent gauges.

It is bronze weather-stripped throughout, carries the approval of the National Board of Fire Underwriters, also Air Infiltration test made by the University of Wisconsin and has stood the real value of the scientific test.



pose, or on the various floors, the building service must be brought to within 18 inches of the wall through which the street service will be produced.

44. Wrapping Building Service.

A building service run under an open porch connecting the front and rear sections of a building, must be covered with mineral wool or steam pipe covering and boxed in.

45. Encasing Building Service.

A building service laid through a masonry wall must be encased and the pipe left resting on the bottom of the casing with a 1½ inch clearance on top.

46. Opening in Building Service.

The opening in a building service should always be on the left hand side of the riser which it is to supply.

See table for meter sizes and dimensions for distance to be spaced.

47. Test Pipe to Prove Work.

Every building service must have a ¾ inch test pipe to which a gauge can be attached.

48. Building Service Header.

When it is necessary to set more than two meters together, a building service header must be supplied with an opening for each meter. All openings must be faced up sufficiently to allow condensation to drain to the service.

49. Services for Stores.

A building containing stores must have a separate service for each store, unless a public meter room or other public place on the floor or below that where the gas is to be used is provided.

Where owner desires two separate services in one trench, each building service must be terminated at least 2 feet clear of the doorways.

50. Services for Apartment Buildings.

In apartment buildings of 12 flats and under, only one Company's service will be allowed. This will make it necessary to connect the various building services supplying the groups of risers regardless of fire walls, and extend one building service to the point where the Company's service will come in.

In apartment buildings containing more than 12 flats, two or more Company's services will be allowed.

51. Services for Court Buildings.

In a building which faces on a parkway or has a parkway or court in the center, the Gas Company will run one service in the court or parkway, and branch therefrom to supply the various building services.

The gas fitter may run building services through fire walls and connect them, but these must be extended as close to the front of the building as possible.

Any building service in a court building must not be terminated in a finished room.

See sketch of court building on page 401.

52. Locating Service to Corner Building.

To avoid complications when working on a corner building, the gas fitter should obtain from the Gas Company a written notice giving the exact location where the Company's service will enter the building.

53. Building in Rear of Corner Lot.

A building on the rear of a corner lot must be supplied from the side street if a gas main is on that street. It may be supplied either from the front building or by a long service run in the parkway from the main supplying the front building provided that at no point this long service will have less than 2 feet of cover. Bearing in mind

that if possible the services must be extended in such a manner as to avoid using a drip.

Should a long service be used in the parkway, a separate ticket for the long service must be used as the customer is allowed 100 feet of pipe free and must pay for the balance. A service order will be used for the service taken from the pipe extended in this manner and will be treated the same as any new service.

54. Building in Rear of Lot.

When a building in the rear of a lot is to be supplied, a separate service should be used wherever possible. If, however, an independent supply is not practicable, the building service for the front building, if there is one, must be extended to the rear of the building, and of a size not less than 1½ inches to the rear building, which can be supplied from it also.

In all cases where a supply to a rear building is desired the Gas Company must be consulted.

55. Opening in Wall for Service.

In a new building, an opening should be provided in the wall for the Gas Company's service. The most preferable way is to build a sleeve of wood, rectangular in shape, 12 inches by 5 inches, with an inside partition about 6 inches from the street end of the sleeve.

Application should be made to the General Office of the Gas Company to locate the wall and the point in the wall wherein the sleeve should be built, so that when the service pipe is run, it will pass through the opening, provided therefor. In this way the damaging of foundation walls will be avoided.

56. Opening in Floor for Service.

When a service connection may have to be made above the floor level, an opening must be left in the floor so that the street service can be introduced without disturbing anything.

The District Shop will on notification instruct the gas fitter where to leave this opening.

57. Bringing Building Service to Street Service.

When the Company's service is extended into a building before the house-piping is completed, the building service must be brought within 18 inches of the wall at a point where the street service enters the building except where the company service comes through the bay, then the building service must be brought to the nearest corner of the bay.

58. Terminating Building Service.

A building service must not be terminated in, or run in such a manner that the street service will be opposite or under a coal chute, or any opening in the sidewalk so that it is liable to be broken or damaged by falling material.

59. Work Reserved.

This Company does not permit anyone but its own authorized employees to place any piping or connections on any part of either the outlet or inlet meter connections, turn on the gas, disconnect, move, or interfere in any way with its piping, meters or connections.

60. Resetting or Changing Location of Meter.

If, after a meter is once installed, the customer desires alterations in the house-piping which would necessitate the disconnecting, reconnecting or changing the location of the meter, a charge will be made by the Gas Company for this work.



Modern architectural designs demand modern treatments of the materials through which they are expressed.

The versatility of Aetco Tile decorative schemes affords limitless opportunity for decorative expression.

Our Architects Design Service Department is prepared to furnish color sketches and design suggestions for every type of tile installation. A thorough knowledge of color harmonies and tile decoration assure you of an authentic interpretation of your individual problem.

Address all design requests to:

Architects Service Department
American Encaustic Tiling Co., Ltd.

Aetco Building, 16 East 41st Street, New York, N. Y.

CHICAGO SHOWROOM AND OFFICES

332 South Michigan Ave.

McCormick Building



Floor, Wall, and Faience Tile
of Every Description

BASIC SPECIFICATIONS FOR TILEWORK

As Recommended by The Associated Tile Manufacturers

Second Edition, 1924

EXTENT OF WORK

(1) The following specification shall be known and hereafter identified as "Basic Specification for Tilework, Second Edition, 1924 as issued by the Associated Tile Manufacturers." It specifies how the work shall be done, beginning at the bottom of the concrete setting beds and at the back of the scratch coats, carrying each through to and including the finished tile surfaces.

(2) The location and extent of tilework together with the kinds, grades, sizes, colors and designs of the tiles shall be governed by the architect's drawings, specifications and schedules.

(3) All materials and labor necessary for the completion of the tilework shall be furnished in accordance with this Basic Specification except as modified, if at all, by the architect's drawings, specifications and schedules.

(4) Any such modifications, and the general conditions, and other provisions of the architect's specification, shall be accepted as conditions to this Basic Specification, and where conflicting, shall take precedence over it.

TILES

NOTE. See "Publication K-200" for Gradings, Shapes, Colors, Finishes, Nomenclature, and manufacturing conditions, also K400 "Glazed Tiles and Trimmers" for standardized caps, bases, etc., K500 "Ceramic Mosaic" for standardized patterns for fields, borders, trimmers, etc., of ceramic mosaic.

(5) **Samples:** If required in the architect's specification, typical samples of each kind and grade of tiles as specified and proposed to be used, and shop or setting drawings or rubbings, shall be submitted to the architect for approval.

(6) Each sample shall be marked with the name of the manufacturer and the grade of the tile. Approved samples shall be retained by both the architect and the tile contractor.

(7) **Grades and Certificate:** Before setting any tiles, the tile contractor shall furnish to the architect a certificate of grade, properly filled in on the Form of Grade Certificate of the Associated Tile Manufacturers. This certificate shall be signed by the manufacturer of the tiles; shall state the grade, kind and full quantities of tiles; and give identification marks for all packages of tiles furnished under this contract. Packages shall be branded with corresponding shipping marks and shall be subject to inspection by the architect or his representative before being opened.

CEMENTS, LIME AND AGGREGATES

(8) All cement and hydrated lime shall be delivered in the original containers bearing the brand and maker's name.

(9) **Portland Cement:** All Portland cement (including white) shall comply with the Standard Specifications and Tests for Portland Cement of the American Society for Testing Materials, Serial Designation C-9-17, together with all subsequent revisions adopted by said Society.

(10) All white cement shall be white Portland of an acceptable brand of American manufacture.

(11) **Lime:** All hydrated lime shall comply with the Tentative Specifications for Hydrated Lime for Structural Purposes of the American Society for Testing Materials, together with all subsequent revisions adopted by said society.

(12) **Sand:** All sand shall pass an 8-mesh sieve and shall be free from organic matter, salt, or alkali, and if it contains more than 5 per cent by volume of material passing a 100-mesh sieve shall be well washed. All sand for concrete shall be graded from fine to coarse.

(13) **Crushed Stone or Gravel:** Crushed stone or gravel shall be hard and well graded from $\frac{1}{4}$ " to 1" ring size. If loam or clay coat the particles, or are present to a greater extent than 5 per cent by volume, the stone or gravel shall be washed till not more than that amount is contained.

(14) **Slag:** Slag shall be clean, dense, crushed blast furnace slag, weighing not less than 70 pounds per cubic foot when loosely placed in the measure, and containing not more than 1.3 per cent of sulphur as sulphides.

(15) **Cinders:** Cinders shall be thoroughly vitrified, and shall be free from ashes, unburned coal or coke. Large lumps shall be broken up. All cinders shall be screened free from particles smaller than $\frac{1}{4}$ " and shall be well washed. House ashes and cinders containing sulphur in any form shall not be used. (See Par. 17.)

NOTE: Where cinders or cinder concrete are used, it is recommended that metal plumbing and heating pipes be wrapped.

CONCRETE AND MORTAR

(16) **Concrete:** Concrete shall consist of one volume of Portland cement, two and one-half volumes of sand, and five volumes of gravel, crushed stone or slag, or shall consist of one part Portland cement and six parts of well graded coarse sand. At the option of the contractor, five pounds of hydrated lime may be added for each bag of Portland cement.

(17) Cinders may be used in place of gravel, crushed stone or slag, unless prohibited by the architect's specification.

(18) Thoroughly mix all cement and aggregates until the concrete is of uniform color and consistency throughout, using a minimum quantity of clean fresh water. Mixing may be by hand or by acceptable batch machine mixers.

(19) Concrete shall be spread promptly after mixing and shall be well compacted to uniformly rough surfaces at proper level to receive the setting mortar.

(20) **Mortar:** Sand, cement and lime shall be thoroughly mixed in the proportions hereinafter specified under Setting, Par. (57), until of uniform color and required consistency. Mortar shall not be retempered, and tile shall not be set in mortar that has reached its initial set.

METAL LATH, SHRINKAGE MESH AND PAPER

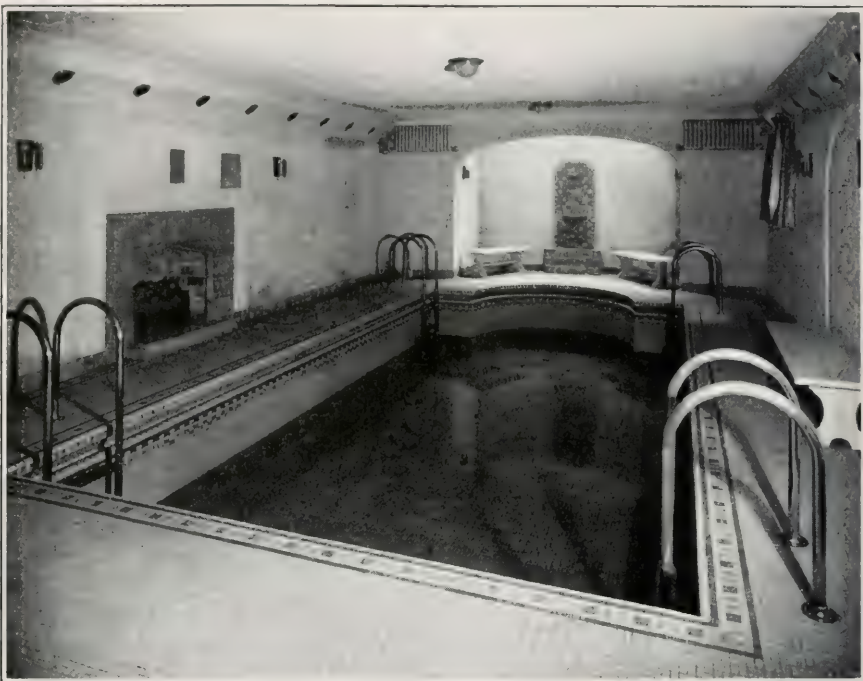
(21) **Metal Lath:** Metal lath shall be coated expanded metal, coated perforated metal, or coated wire lath.

(22) Lath on vertical surfaces where supports are not over 16" on centers and lath for ceilings, shall be metal lath weighing not less than 3.4 lbs. per sq. yard or wire lath not less than No. 18 gauge (.047" diameter), $2\frac{1}{2}$ mesh to the inch.

(23) Lath on vertical surfaces, where supports are placed not over 12" on centers, shall be metal lath weighing not less than 3 lbs. per sq. yard, or wire lath not less than No. 20 gauge (.035" diameter), $2\frac{1}{2}$ mesh to the inch.

(24) If the distance between the centers of the structural supports of any lath is more than 16", the lath behind the tilework shall be provided with stiffeners not over 12" on centers.

(25) Lath shall be stretched tight and shall be secured at all bearings with fastenings not more than 6" apart, as follows: To woodwork with not less than one 1" bright staple, or one six-penny bright wire nail; to metal furring with hammered prongs or twisted loops of wire; and to gypsum blocks and to masonry with special



Lombardie Tiled Swimming Pool.
Batchelder Tile Mantel and Fountain.
Harold N. Selling Residence, Evanston, Illinois.
Ernest Mayo & Mayo, Architects.

TILE Floors and
Wainscot-
ings

Fountains Mantels

SWIMMING POOLS

Updike & Company

612 N. Michigan Avenue, Chicago, Ill.

Telephone SUPERior 8355

Quality

Service

VISIT OUR DISPLAY ROOMS

ly hardened steel nails or self-clinching nails. In driving staples or nails the lath shall not be flattened or damaged.

(26) Vertical joints in lath shall not occur except at structural supports, and shall there be lapped one full mesh. All horizontal joints of lath shall be butted, and laced or tied with wire, at least once between supports.

(27) **Shrinkage Mesh:** Shrinkage mesh where specified herein for use in concrete setting beds shall be No. 16 gauge, unpainted expanded metal of from 2" to 3" mesh, or galvanized wire fabric of one of the following sizes. Rectangular mesh: No. 8 gauge, (.162" diameter) wire at 3" centers crossed by No. 10 (.135" diameter) wire at 8" centers, or triangular mesh, No. 8 wire at 4" centers, diagonally laced with No. 14 wire 4" centers; or 4"x7" hexagonal mesh of No. 10 gauge wire.

(28) Shrinkage mesh shall be placed well within the mass of the concrete setting bed and where more than one width or length is required shall be lapped not less than one-third of a mesh. The mesh shall butt against walls and partitions and shall not be turned up.

(29) **Building Paper:** Building paper shall be tar or asphalt saturated paper weighing not less than eleven (11) lbs. per sq. ft. It shall be lapped at least 2" and, in connection with floors, shall be turned up at the walls at least 2 inches.

SETTING OF TILES

(30) **General:** All tiles shall be firmly secured in place. Joints shall be well filled, and lines shall be kept straight and true, and all finished surfaces brought to true and level planes. The completed work shall be free from cracked or broken tiles.

(31) **Borders and Patterns.** Where borders, lines, patterns, panels or other effects are a part of the work, the tiles shall be properly spaced, and shall accurately reproduce designs, shown on the drawings or effects described in the specification of the architect.

(32) **Edges:** All intersections and returns shall be perfectly formed. All cutting and drilling of tiles shall be neatly done without marring the surface. The cut edges of tiles against any trim, finish, built-in fixtures, etc., shall be carefully ground and jointed. Around electric outlets, plumbing pipes, or fixtures and fittings, the tile shall fit close, so that the regular plates, collars or coverings will overlap the tile.

(33) **Laying Out:** All tilework shall be so laid out on floors and lengthwise on walls that, wherever possible, no tiles less than half full size shall occur. For heights stated in feet and inches, unless tilework is intended to exactly fill vertical spaces, courses shall be maintained full to produce nearest attainable height within a variation above or below equivalent to less than one-half course to avoid cutting of tiles which would otherwise be necessary.

(34) **Tile Packages Kept Dry:** All tiles shall be kept dry while in packages and shall not be allowed to lie in or upon wet sawdust or similar materials.

(35) **Soaking before Laying:** All tiles, except vitreous tiles and ceramic mosaic, shall be soaked in clean water before being set.

(36) **In Freezing Weather:** In freezing weather concrete setting beds or scratch coats or tiles shall not be placed in unheated portions of the structure.

NOTE: For Floating Method and Buttering Method of setting tiles see Par. (95), (97) and (98).

TILED FLOORS AND HORIZONTAL SURFACES

(Other than Ceilings, Soffits and Sills)

(37) **Concrete Setting Beds: General—**Concrete setting beds of stone, gravel or slag, or sand concrete, shall be 2" thick, ex-

cept that directly on earth or fills referred to in Par. (53) they shall be 3" thick.

(38) Concrete setting beds of cinder concrete, Par. (17), shall be 2½" thick, except that directly on earth or fills referred to in Par. (53) shall be 3" thick.

(39) Where joists are chamfered, the point of the joist shall be at least ¼" below the top of the concrete setting bed.

(40) The upper flanges of any steel beams projecting into concrete setting beds shall be covered with loose sheet metal or building paper to prevent adhesion of the concrete setting beds.

(41) All floor arches or slabs, and all wood floors, shall be swept free of loose particles before placing any concrete setting beds.

(42) The Contractor shall not install any tilework in floors of shower baths, except when located in basements, until a pan or saffing of lead or other metal has been placed, turned upon all sides, and made watertight by other contractors. The finished surface of the tile floor shall be sloped to drain properly into the outlet.

(43) **Concrete Setting Beds on New Wood Construction:** Unless otherwise provided for in the architect's specifications, a layer of building paper, lapped and turned up, shall be placed over wood floors as described in Par. (29).

(44) Concrete setting beds shall be reinforced with shrinkage mesh as described in Par. (27) and (28).

(45) **Concrete Setting Beds on Old Wood Construction.** Where tile floors are to be laid over existing wood floors, the tile contractor shall cover the existing wood upper floor, or under floor, as the case may be, with building paper in accordance with the provisions of Par. (29).

(46) On the surface thus prepared a concrete setting bed, 1" thick, composed of sand and cement as described in Par. (16), with shrinkage mesh as described in Par. (27) and (28), shall be spread. This concrete setting bed shall finish at such thresholds as are provided by the architect's specification, the thresholds being of sufficient thickness to receive a ½" layer of setting mortar plus the thickness of the tiles. Where joists are chamfered, the point of the joist shall be at least ¾" below the top of the concrete setting bed.

(47) **Concrete Setting Beds on Pressed Steel Construction:** In connection with pressed steel joist systems of floor construction, the metal reinforcement and concrete slabs will be furnished and placed by other contractors as a part of such systems. Mortar setting beds only shall be provided by the tile contractor, and shall be placed directly on the concrete slab, unless joists have been set as low as mentioned in Par. (48).

(48) If steel joists are shown or specified lowered for the passage of pipes, concrete setting beds of thickness and as specified in Par. (49) and (50) shall be provided.

(49) **Concrete Setting Beds on Concrete Slabs or Other Masonry Construction:** Concrete setting beds shall not be placed until the exposed surfaces of masonry floor slabs, arches, or other structural work, shall have been brought to the required level or surface for the concrete setting beds by other contractors, and not until such surfaces are free from mortar droppings, projecting joists, etc., and so they shall present comparatively smooth and even surfaces for concrete setting beds without any depressions, cracks, holes or open joints.

(50) On the surfaces thus prepared, spread the concrete setting beds in accordance with Par. (37) or (38).

(51) **Concrete Setting Beds on Other Concrete Over Earth or Fills: Interior—**Where concrete setting beds for tilework are to be laid on concrete which has been placed over earth or fills, the setting beds shall not be laid until the lower work is suitably prepared by others as specified for concrete

BEAUTY

and Permanency at Very Low Cost

Do You Know—

The new Chicago Daily News Building, Stop and Shop, Mather Tower, Morgan Park Military Academy, Chicago Motor Club, The Steuben Club, and many others are using Terrazzo floors?

There Are Sound Reasons—

Nothing can be compared in beauty, absolute permanency, fire-proofing, and imperviousness. Original installation-cost surprisingly low. Artistic treatment unlimited. Construction method assures perfection in detail with no maintenance. Terrazzo improves in appearance and durability as time goes on.

You should know more about this new artistic, practical and scientific process. This information and service is at your call.



Western Mosaic and Terrazzo Company

4214-16 Ogden Avenue, Chicago, Illinois

Telephone Lawndale 8567-8568

Stairways — Walls — Interiors or Everlasting Beauty
Fireplaces — Perfect Floors

slabs and other masonry construction, Par. (49). On the surface thus prepared, place concrete setting beds to the thickness specified in Par. (37) or (38).

(52) **Exterior:** Follow specifications for interior concrete setting beds, Par. (51), except that cinders shall not be used in the concrete.

(53) **Concrete Setting Beds Directly on Earth or Fills:** Interior—Where concrete setting beds for tilework are to be laid on earth or on fills of cinders, gravel or other materials, (sand cushions separately specified) without intervening slabs of concrete, the concrete setting beds shall be 3" thick, of stone, gravel, slag or sand concrete, and shrinkage mesh shall be placed in these setting beds in accordance with Par. (27) and (28). Cinders may be used in place of other aggregates unless prohibited by architect's specification.

(54) **Exterior.** Follow specifications for interior concrete setting beds, Par. (53), except that cinders shall not be used.

(55) **Cleavage Planes: Sand Cushion—**Where sand cushions are provided for in the architect's specification as a means of absorbing vibration or to afford a cleavage plane, a layer of clean sharp sand, not less than $\frac{1}{2}$ " thick, shall be spread and thoroughly compacted to a smooth and level surface. Over sand cushions shall be laid a layer of building paper as described in Par. (29), ready to receive the concrete setting beds.

(56) **Building Paper:** Where so provided in the architect's specification, spread a layer of building paper in accordance with Par. (29), before placing concrete setting beds, to form a cleavage plane between concrete setting beds and surfaces underlying them.

(57) **Mortar Setting Beds:** Mortar for setting beds shall consist of one part Portland cement and three parts sand, and shall not be less than $\frac{1}{2}$ " thick.

(58) Unless the mortar setting bed is spread the same day, or the day after the concrete setting bed has been placed, the concrete setting bed shall be thoroughly saturated with clean, fresh water, and its surface uniformly hand dusted with Portland cement immediately before spreading the mortar of the setting bed.

(59) The mortar shall be spread until the surface of the mortar setting bed is absolutely true and even in plane, either level or uniformly sloped for drainage, as the case may be. For all surfaces over 100 sq. ft. in area, screed strips shall be set as temporary guides to assure these results.

(60) As large an area as can be covered with tile before the mortar has reached its initial set, shall be placed at one operation. When more setting mortar has been spread than can thus be covered, the unfinished portion shall be removed and cut back to a clean, bevelled edge.

(61) **Setting of Tiles:** Portland cement shall be uniformly hand dusted over the surfaces of the mortar setting beds immediately preceding the setting of the tile. The tiles shall be placed upon and firmly pressed and tamped into the mortar until exactly true and even with the finished floor lines.

(62) In the case of ceramic mosaic, the joints between the sheets shall be kept the same width as those between the mounted tile and set without showing where the sections join.

(63) Where the area of any floor is over approximately 100 sq. ft., the tiles or ceramic mosaic sheets shall be laid to a straight edge at regular intervals.

(64) Wherever borders or defined lines occur, they shall be laid before the field or bodies of the floors or spaces to be tiled, and the tile shall be set as before specified. The inner edges of all borders against fields or bodies shall be kept straight, and any cutting of tiles for irregularities in wall lines or vertical planes shall be done along the outer edges.

(65) Thresholds, if specified to be included, shall be set in a similar manner to borders, and if not included, the tilework of floors shall be brought to true lines, level with adjoining floors and stopped under doors, unless shown or specified to be continued into closets or other contiguous spaces.

(66) Hearths, unless otherwise detailed or specified, shall be set flush with the surface of adjoining floors. In connection with hearths and fireplaces, supply and set any ash drops, features, fittings, or other materials, specified or scheduled by the architect.

(67) Stairtreads, floors of shower baths, swimming pools, special hospital floors, and other surfaces not intended to be level, shall be sloped as detailed or directed for purposes of draining.

(68) Tiled nosings, coves, curbings, gutters, or other moulded or shaped features, shall be thoroughly backed or built up with mortar or concrete. They shall be rigidly placed, reinforced or otherwise made firm and secure. Tiled window sills and jambs, partitions, copings, or other similar features, shall be set as described herein under Tiled Walls and Vertical Surfaces.

(69) Where bath tubs are of built-in types, or extend to floors, the concrete setting beds over wood construction shall be continuous under them, and shall form close junction with all surrounding vertical planes. Tiling shall be omitted under such tubs, but under free standing tubs the tiling of floors shall be continuous to the surrounding tiling of vertical planes.

(70) As soon as the cement mortar beds have sufficiently set, the tiles on floors or other horizontal surfaces shall be well washed with clean water, and the joints between the tile grouted or jointed as mentioned under Par. (71) to (75) inclusive.

(71) **Grouting and Jointing:** The joints between all units of ceramic mosaic and between the abutting sheets, as laid, shall maintain the standard mounting width approximately $\frac{1}{8}$ inch.

(72) **Width of Floor Joints:** Unless otherwise shown, specified, or stipulated, the joints of other tiles shall approximate the following width, with uniform variance therefrom, either more or less, as may be desirable to cause the units, in the hands of skilled workers, to accommodate themselves to given spaces.

Vitreous and Semivitreous Tiles..... $\frac{1}{16}$ "

Flint and Hydraulic Tiles..... $\frac{1}{8}$ "

Plastic Tiles and Faience..... $\frac{3}{4}$ "

Quarry Tiles..... $\frac{1}{2}$ "

Joints in the fields of walls and floors should not run straight through with the joints in the base and top mouldings, but should break in order to emphasize the different function of the moulding as distinguished from the field.

(73) All ceramic mosaic and other tiles set with close joints shall be grouted with Portland cement mixed with water to the consistency of thick cream. The grout shall be forced into the joints, sprinkled with dry cement and finished flush and true. All surplus grouting shall be removed and the faces of tiles left clean. In cases where acid solutions are required to clean the face of the finished tilework of surplus grouting or other particles of foreign matter, all hardware, such as hinges, cupboard trim, etc., shall be covered first by a coating of vaseline to protect the metal from the possible effect of acid fumes.

(74) All joints not grouted shall be completely filled with mortar consisting of one volume of Portland cement and two volumes of sand as before specified and, at the option of the tile contractor, tempered with hydrated lime to extent of not more than 10 per cent of the volume of cement and sand. All surplus mortar shall be wiped off and the faces of tiles left clean. White Portland cement, white sand, or mortar colors, in

JOHN S. HAWKINSON CO.



**TILES for
FLOORS, WALLS, FIREPLACES**

DISPLAY ROOM AND OFFICE

233 RAILWAY EXCHANGE BUILDING

JACKSON AND MICHIGAN BOULEVARDS

TELEPHONE HARRISON 0881

Telephones Harrison 0085-0086

Interior Tiling Company

CONTRACTORS *for*

Wall, Floor and Fireplace Tiling

*Ceramic Mosaic, Vitreous, Flint, and Quarry Tile Floors
Glazed and Faience Tile Wainscotings*

Office and Showrooms, 5th Floor Isabella Building

21 EAST VAN BUREN STREET

CHICAGO

joints of tiles on horizontal surfaces—or fire clay for fireplace backs and jambs—shall be used only when and where so provided in the architect's specification or schedule and shall then replace the Portland cement or plain sand as here specified.

(75) After being cleaned as just described, floors, or horizontal surfaces in each room or portion as completed, shall be closed to traffic or work until the tiles are firmly set, Par. (118). After this, all completed tilework shall be finally turned over in clean condition as described in Par. (119), (120) and (121).

TILED WALLS AND VERTICAL SURFACES

(76) **Preparation for the Scratch Coat: General**—Scratch coats shall not be applied until substantial grounds, plugs and other provisions have been installed by respective contractors to receive plumbing fixtures, electric outlets, radiator brackets, or any other fixtures or fittings to be secured against tiled surfaces.

(77) In new construction work, when scratch coats are to be applied directly to concrete, brick, hollow building tile, stone or other masonry without furring, the masonry surfaces shall be thoroughly moistened but not saturated.

(78) In existing structures, where scratch coats are to be applied directly to masonry without furring, when such masonry has been previously coated with cement mortar or cement plaster, the mortar or plaster shall be removed, or hacked and wire-brushed in such a manner as to restore satisfactory suction for complete bonding of the scratch coat.

(79) Where such existing masonry has been coated with mortar or plaster containing gypsum or lime, the mortar or plaster, or any painted surfaces, shall be entirely removed and the masonry hacked and wire-brushed as just described. In lieu of removing or hacking and brushing, such existing surfaces, if conformable to architect's details, or if approved, may be metal lathed to comply with requirements of Par. (86) and (88).

(80) Scratch coats for tilework shall not be applied to new unfurred surfaces of concrete or other masonry construction until such surfaces shall have been brought to the required plane, plumb, reasonably straight and true, by other contractors, with the faces free of fins, excessive voids, or projecting joints, and left fairly rough, ready for the scrubbing specified in Par. (82).

(81) Old surfaces of concrete, brickwork or stone, if smooth, shall be hacked, roughened, or raked by the contractor applying scratch coats as may be necessary to provide satisfactory bonding for the scratch coats.

(82) Unfurred concrete to be tiled, whether new or old, shall be thoroughly scrubbed to clean the surface and give it additional roughness. At the option of the tile contractor this may be done by the use of wire brushes or by using muriatic acid diluted with 6 to 10 parts of water, scrubbed on until the aggregate is exposed, after which all traces of acid shall be removed by thorough rinsing.

(83) **On Wood Studding or Wood Furring:** On wood studding or wood furring to be tiled, furnish and attach building paper and metal lath as described in Par. (21) to (26) inclusive and Par. (29). This shall apply in the case of either old or new structures, as any existing lime or gypsum plaster shall invariably be removed by whatever contractor is specified in such cases; old wood lath to remain but shall be covered with metal lath.

(84) Where tiles form architraves of doors, windows, or medicine cabinets, trims of openings, or other features and bases, furnish and secure strips of metal lath as described in Par. (21) to (26) inclusive.

(85) **On Metal Studding or Metal Furring:** Where pressed steel studs, metal channels,

tees, or other metal supports are used for partitions or furring, the metal lath in connection with same will be furnished and applied by other contractors.

(86) **On Gypsum Blocks.** Where tiles are to be set against gypsum blocks, furnish and place a layer of building paper; this is to be overlaid with stiffened expanded metal or stiffened wire lath as described in Par. (26), the lath to be secured in place by special anchorage or lacing as conditions require.

(87) **Alternate.** At the option of the tile contractor one heavy coat of asphaltum paint or other equal damp-proofing coat may be substituted for the building paper back of the metal lath before specified for use on gypsum blocks.

(88) **On Cork or Other Insulation:** Where tiles are to be set against cork or other insulation, furnish and attach metal lath as described in Par. (21) to (26) inclusive. In such installations, the scratch coat shall contain suitable proportions of an established brand of waterproofing compound mixed in accordance with manufacturer's directions.

(89) **The Scratch Coat:** A scratch coat shall be placed back of all tiles. The scratch coat on unfurred masonry shall be applied in conformity with Par. (76) to (82) inclusive. In all other cases, the scratch coat shall be applied to metal lath.

(90) Where bathtubs of built-in types are set against walls or partitions of masonry or gypsum construction, the scratch coat behind tubs shall be omitted below the undersides of rims. Against supports involving metal lath on wood, or steel studs, or furring, the scratch coat shall continue to and form close junction with concrete setting beds of floors. The tiling on all vertical surfaces in contact with built-in tubs shall abut the top of the rim, separated therefrom by a full width joint.

(91) The mortar for scratch coat shall consist of one volume of Portland cement and three volumes of sand. At the option of the contractor, hydrated lime may be added not to exceed 10 per cent of the volume of cement and sand, and plasterer's fibre or hair may be incorporated in the scratch coat.

(92) The scratch coat shall be $\frac{1}{4}$ " thick, or more if necessary, to make an even and true surface at the proper distance from the face of the tiles allowing for the thickness of the tile and for a $\frac{1}{4}$ " bed of setting mortar for floating work and a $\frac{1}{2}$ " bed of setting mortar for buttered work. The scratch coat, at the option of the contractor, may be applied in two coats, instead of one.

(93) The scratch coat shall be applied not less than twenty-four hours nor more than forty-eight hours before commencing to set the tiles. While still plastic the scratch coat shall be deeply scored or scratched, horizontally, approximately 1" apart.

(94) **Setting of Tiles:** Immediately before setting tiles, the scratch coat shall be thoroughly moistened with water, but not saturated.

(95) On the surface thus prepared, the mortar for setting the tiles shall be applied in accordance with either of the methods described in Par. (97) and (98). In the absence of stipulations to the contrary, tiles may be set by either the floating or buttering method.

(96) Setting mortar shall consist of three volumes of sand and one volume of Portland cement, to which hydrated lime not to exceed one-tenth the volume of the cement and sand combined shall be added.

(97) **Floating Method:** Screeds or temporary guide strips shall be mortared plumb and true onto the scratch coat, to accurately indicate the surface plane of the mortar setting bed, which shall be rodded and floated flush with the guide strips. A skim of neat Portland cement shall be applied to the mortar setting bed or the back of each tile as laid. Each tile shall be beaten into place

and brought flush in plane with the other tiles.

(98) **Buttering Method:** The scratch coat shall be spotted with small pieces of tile mortared plumb and true to accurately indicate the plane of the tiled wall when finished. Each tile shall be buttered and tamped in place and brought to a plumb and true surface, flush with the spots and with the other tiles. The back of each tile shall be completely covered with the mortar, bed at back of tiles shall be full and even, and all corners and crevices filled.

(99) **Fireplaces:** Tiles of fireplace facings or mantel breasts shall be set by either the floating or buttering method, but tiles of backs and jambs shall be set by the floating method unless shown or specified to be set flat, when they shall be tightly bedded against the surrounding masonry and set with full joists pointed on the face. Hearths to be as specified in Par. (66).

(100) **Inserts:** In the absence of stipulations to the contrary, any tile inserts indicated or specified, may be set by either the buttering or floating method.

(101) **Trimmers:** All caps, bases, coves, mouldings, or other trim tiles, shall be backed full with mortar, and tamped into place. The reference by the architect in his specification or schedule to any cap, base, quarter-round, bead, cove, combination tiles with cove corner or angles, or any moulded tile, shall be taken to carry with it the inclusion of all requisite returns, stops, angles, corners or other "trimmers" which are an established standard of the Associated Tile Manufacturers, incidental to the trimmers mentioned, and they shall be furnished and set by the tile contractor, as if especially called for.

(102) **Grouting and Jointing:** Vertical units and joints shall be maintained plumb and even, and all caps, bases, mouldings and horizontal units or joints shall be maintained level and even. Joints in the tilework of shower bath partitions, window jambs, alcoves or in returns to contiguous spaces, shall be maintained level and true with the joints of main fields. Every fourth course of tile shall be brought to a level and straight line. Wooden wedges, if used for this purpose, shall be removed before grouting is done.

(103) As soon as the mortar setting bed has sufficiently hardened, the tiles on walls or other vertical surfaces shall be well washed with clean fresh water and joints between tiles shall be grouted or jointed as mentioned under Par. (104), (105) and (106) unless otherwise stipulated. With the exception of the white Portland cement specified for joints of white tiles in Par. (104), white cement, white sand, or mortar colors, shall not be used in grouting or jointing, except when expressly so provided as mentioned in Par. (74).

(104) Joints in white bright glazed tiles shall be maintained at the customary size, approximately $\frac{3}{64}$ ", and shall be filled with white Portland cement mixed with water to the consistency of thick cream. All traces of this grouting shall be wiped from faces of tiles before hardening, and all joints shall be left full and smooth.

(105) **Width of Wall Joints:** Unless otherwise shown, specified, or stipulated, the joints of other tiles shall approximate the following widths with uniform variance therefrom, either more or less, as shall be desirable to cause the units, in the hands of skilled workers, to accommodate themselves to given spaces.

Enamels, Vitreous and Semivitreous Tiles $\frac{1}{8}$ "
Plastic Tiles and Faience..... $\frac{1}{4}$ "

(106) Where other kinds of tiles, including ceramic mosaic, are set on vertical surfaces they shall be grouted or pointed and left clean in accordance with Par. (71) to (74) inclusive, and (119) to (121) inclusive.

TILED CEILINGS, SOFFITS AND SILLS

(107) **Preparation for the Scratch Coat: On Hollow Building Tile**—When ceilings, soffits, or sills are to be tiled on unfurred hollow building tile, the provisions contained in Par. (76) and (77) shall be complied with before applying the scratch coat, which shall contain suitable proportions of an established brand of waterproofing compound, mixed in accordance with manufacturer's directions.

(108) **On Concrete:** The scratch coat shall not be placed on an unfurred concrete ceiling or soffit, but shall be applied to metal lath furnished and attached by another contractor.

(109) **On Wood Joists or Wood Stripping:** To the underside of new wood joists or new wood stripping, furnish and attach expanded metal or wire lath as described in Par. (21) to (26) inclusive. For existing wood joists or stripping Par. (83) shall be followed.

(110) **On Suspended Ceilings with Metal Supports:** Supports and metal lath for such types of construction will be furnished and applied by other contractors.

(111) **On Gypsum or on Cork or Other Insulation:** Preparation for scratch coat against gypsum, or against cork, or other insulation, shall be made in accordance with Par. (86), (87) and (88).

(112) **The Scratch Coat:** A scratch coat shall be placed back of all tiles, and be applied either directly to the hollow building tile as mentioned in Par. (107), or applied to expanded metal or wire lath, either furnished and attached by the tile contractor as described in Par. (109) and (111), or by other contractors, in accordance with the type of support, as mentioned in Par. (110).

(113) The mortar for scratch coat shall be as described in Par. (91) and shall be applied to conform to Par. (92) and (93) providing a $\frac{1}{4}$ " mortar setting bed instead of $\frac{1}{2}$ ".

(114) **Setting of Tiles:** All tiles shall be set in mortar and in such manner as to comply with the descriptions in Par. (94) to (98) inclusive and with Par. (100) to (106) inclusive.

SWIMMING POOLS

(115) The tilework of swimming pools, or of Turkish bath, steam rooms, etc., shall be prepared for and set in accordance with the requirements of all other portions of the Basic Specification and in addition the mortar setting beds and joints shall contain suitable proportions of an established brand of waterproofing compound mixed in accordance with manufacturer's directions. When the walls and floors of swimming pools are not waterproofed, the scratch coats and concrete setting beds shall be waterproofed as specified for the mortar setting beds.

(116) Life rails shall be reinforced with properly shaped expanded metal and the high point shall be brought to an exact level on all sides of the pool. Scum gutters shall be formed in accordance with details and drained to the outlets with a high point between each pair of outlets.

ACCESSORIES

(117) The furnishing and setting of accessories such as andirons, grates, medicine cabinets, mirrors, recessed heaters, paper holders, soap cups, towel racks, shelves, etc., are not included, unless specified or scheduled as a part of the tile contract and listed in detail. When included, they shall be furnished, delivered and set by the tile contractor.

FINAL CLEANING AND RESPONSIBILITY

(118) The contractor shall post suitable notices or make other provisions to the effect that no one shall pound about freshly tiled walls or ceilings, nor walk upon freshly tiled floors, for several days after the tiles are set.

(119) **Cleaning:** Upon completion of the

various portions of his work, the tile contractor shall remove all unused materials, rubbish, etc., in connection with this contract and shall give the tilework one thorough cleaning at the time of its completion. (See Par. 73.)

(120) After completion and cleaning in accordance with Par. (119) the obligation of the tile contractor shall cease as to any damage or injury which may be done to the tilework by others, and as to any further cleaning of the tilework upon final completion of the building as a whole, which additional cleaning shall be done only if so required by the architect's specification.

(121) **Responsibility:** Neither the final certificate nor payment nor any provision in the Basic Specification shall relieve the contractor of responsibility for faulty materials or workmanship, and he shall remedy any defects due thereto, which shall appear within a period of one year from the date of final completion of the structure, unless a longer date is stipulated in the architect's General Conditions or in his Modifications to this Basic Specification.

DEFINITIONS OF CERTAIN MATERIALS AND METHODS REFERRED TO IN THE BASIC SPECIFICATION

See Publication K-200 for other descriptive information

(122) **Buttering:** A method of setting tiles in which the back of each tile is "buttered" with mortar and then set in place. Floating is the alternate method.

(See Buttering Method Par. (98) and Floating Method Par. (97) in Basic Specification.)

(123) **Cleavage Plane:** A layer of material such as sand or building paper, used under certain conditions to separate the concrete setting bed from the under slab or other structural support. This is intended to allow for possible independent movement of the two planes.

Concrete Setting Bed—See Setting Beds.

(124) **Floating:** A method of setting tiles by beating tiles onto the fresh surface of the mortar setting bed. It is the method used for setting mounted sheets of tile, and is the alternative of the buttering method for setting unmounted tiles.

(See Floating Method Par. (97) and Buttering Method Par. (98) in Basic Specification.)

(125) **Grouting:** The method of finishing the joints of tilework in floors, walls, etc., by filling with a mixture of cement and water of the consistency of thick cream. This mixture is called a "grout."

(126) **Hydrated Lime:** Powdered lime resulting from the factory hydration of quicklime. It is delivered in bags as distinguished from quicklime, which latter—in lumps of granular form—requires hand slaking. A standard paper bag of hydrated lime weighs

50 lbs. and in volume is equal to about 1 1/4 cu. ft.

(127) **Inserts:** In the Basic Specification this term refers to isolated or grouped tiles set in a finished surface of other material such as brick, stone, stucco, concrete, or cement, whether on interior or exterior walls or floors. It includes bands and borders as well as panels and accentuation spots.

Mortar Setting Bed—See Setting Beds.

(128) **Mounted Tiles:** For accuracy in setting as well as convenience in handling certain small tiles are mounted on paper pasted to the face of the tiles. These mounted sheets are set as units by the floating method. The paper is soaked and removed after setting.

(129) **Sand Cushion:** A layer of sand sometimes placed under the concrete setting bed to a tiled floor to insulate it from the structure, thereby tending to prevent vibration due to machinery in motion, wind stresses, etc., from being transmitted to the tiled surface, as well as to minimize the possibility of structural cracks appearing on the surface.

(130) **Scratch Coat:** The Portland cement plaster forming the backing for the setting mortar of tiled walls and ceilings. It is scratched, scored, or grooved, to give key for the mortar setting bed.

(131) **Screeds or Scream Strips:** A wooden strip, or a strip of mortar laid on a floor or wall at intervals, to gauge the thickness of setting beds, or to indicate the finished tiled surface.

(132) **Setting Bed, Concrete:** The term Concrete Setting Bed, as used in the Basic Specification, refers to a layer or bed of concrete under a tiled floor or other horizontal tiled surface. This does not come in contact with the tiles, but serves as a foundation on which to apply the setting mortar. It is sometimes known as the underfill or base.

(133) **Setting Bed, Mortar:** Wherever tiles are to be set, a layer of mortar is applied, known as the Setting Mortar or the Mortar Setting Bed. Into this the tiles are beaten when set by the floating method.

(134) **Shrinkage Mesh:** A layer of expanded metal or wire fabric, of a large mesh. Its use tends to prevent cracking of setting beds due to contraction and expansion when affected by temperature changes or due to cracks or settlements in structural supports from other causes.

(135) **Trimmers:** The terms Trim Tile and Trimmers are used interchangeably to designate bases, caps, corners, angles, architraves, and other tile mouldings and shapes, as made and standardized by the Associated Tile Manufacturers to suit the various kinds, grades, and sizes of tiles.



Holabird & Root, Architects

Board of Trade Building

Hegeman-Harris Company, Inc.,
General Contractors

Structural Steel Work

Fabricated and furnished by

AMERICAN BRIDGE COMPANY

Subsidiary of United States Steel Corporation

71 Broadway, New York, N. Y.

Contracting Offices in NEW YORK, CHICAGO, PITTSBURGH
and other principal cities

Manufacturers of STEEL STRUCTURES of all classes, particularly

BRIDGES and BUILDINGS

Steel Barges for Rivers and Harbors, Steel Towers for Electric Transmission,
Turntables (Continuous and Cantilever Types), Roof Trusses, Columns,
Girders, Runways, etc.—Electric Furnaces (Heroult Type).

STANDARD SPECIFICATION FOR STRUCTURAL STEEL FOR BUILDINGS

As Adopted By the American Institute of Steel Construction

Abutting Joints—Section 11
Adjustable Members—Section 19
Beams and Girders
 Proportioning—Sec. 7 (a)
 Web thickness—Sec. 7 (b)
 Web splices—Sec. 7 (c)
 Web stiffeners—Sec. 7 (d)
 (Table and Diagram)
 Web shear—Sec. 5 (d)
 Flange plates—Sec. 7 (e)
 Crane girders—Sec. 7 (f)
 Flange connection to web—Sec. 7 (g and h)
Bearing—Section 5 (e)
Bending—Section 5 (c)
Bessemer Material—Section 3
Bolts
 Shearing—Sec. 5 (d)
 Bearing—Sec. 5 (e)
 Use of finished—Sec. 13 (d)
 Use of unfinished—Sec. 13 (d)
Burning Torch—Section 20 (i)
Columns—Section 5 (b)
 (Table and Diagram)
 Column base—Section 8
Combined Stress
 Direct Bending—Section 10 (a)
 Reversal—Section 10 (b)
Compression—Section 5 (b)
Compression Flanges—Section 5 (c) (Table and Diagram)
Connections—Section 15
Erection—Section 22
Eccentric Loads—Section 9
Eccentric Connections—Sections 15 (b and c)
Expansion—Section 17

Expansion Rollers (Bearing)—Section 5 (d)
Fixed End Beams—Section 15 (d)
General—Section 2
Girders—See Beams and Girders
Impact—Section 4 (b)
Inspection—Section 23
Lattice—Section 16
Loading—Section 4
Material—Section 3
Net Sections—Section 12
Painting—Section 21
Pins
 Bending—Sec. 5 (c)
 Shear—Sec. 5 (d)
 Bearing—Sec. 5 (e)
Reaction Loads—Section 4 (d)
Rivets
 Shear—Sec. 5 (d)
 Bearing—Sec. 5 (e)
 For main connection—Sec. 13 (c)
 Long grip—Sec. 3 (b)
 Nominal diameter—Section 13 (a)
 Spacing—Sec. 14
Shearing—Section 5 (d)
Stresses—Section 5
Symmetrical Members—Section 6
Temporary Bracing—Section 22 (a)
Tension—Section 5 (a)
Tie Plates—Section 15 (a)
Thickness of Material—Section 18
Web Shear—Section 5 (d)
Workmanship—Section 20
Wind—Section 4 (c)
Wind Stresses
 Alone—Sec. 5 (g)
 Combined—Sec. 5 (f)

1. This Specification defines the practice adopted by the American Institute of Steel Construction for the design, fabrication, and erection of structural steel for buildings.

2. General:

To obtain a satisfactory structure, the following major requirements must be fulfilled.

(a) The material used must be suitable, of uniform quality, and without defects affecting the strength or service of the structure.

(b) Proper loads and conditions must be assumed in the design.

(c) The unit stresses must be suitable for the material used.

(d) The workmanship must be good, so that defects or injuries are not produced in the manufacture.

(e) The computations and design must be properly made so that the unit stresses specified shall not be exceeded, and the structure and its details shall possess the requisite strength and rigidity.

3. Material:

Structural steel shall conform to the Standard Specifications of the American Society for Testing Materials for Structural Steel for Buildings, Serial Designation A 9-21, as amended to date

4. Loading:

(a) Steel structures shall be designed to sustain the dead weight imposed upon them, including the weight of the steel frame itself, and, in addition, the maximum live load as specified in each particular case. Proper provision shall be made for temporary stresses caused by erection.

(b) In cases where live loads have the effect of producing impact or vibration, a proper percentage shall be added to the static live load stresses to provide for such influences, so that the total stress found in any member is an equivalent static stress.

(c) Proper provision shall be made for stresses caused by wind both during erection and after completion of the building. The wind pressure is dependent upon the conditions of exposure, but the allowable stresses specified in section five (5), paragraphs (f)

and (g), are based upon the steel frame being designed to carry a wind pressure of not less than twenty (20) pounds per square foot on the vertical projection of exposed surfaces during erection, and fifteen (15) pounds per square foot on the vertical projection of the finished structure.

(d) Proper provision shall be made to securely fasten the reaction points of all steel construction and transmit the stresses to the foundations of the structure.

5. Allowable Stresses:

All parts of the structure shall be so proportioned that the sum of the maximum static stresses in pounds per sq. in. shall not exceed the following:

(a) **Tension:** Rolled Steel, on net section 18,000

(b) **Compression:** Rolled Steel, on short lengths or where lateral deflection is prevented..... 18,000

On gross section of columns,

$$18,000$$

$$1 + \frac{l^2}{18,000r^2}$$

with a maximum of..... 15,000

In which l is the unsupported length of the column, and r is the corresponding least radius of gyration of the section, both in inches.

For main compression members, the ratio l/r shall not exceed 120, and for bracing and other secondary members, 200.

(c) **Bending:** On extreme fibres of rolled shapes, and built up sections, net section, if lateral deflection is prevented..... 18,000

When the unsupported length l exceeds 15 times b , the width of the compression flange, the stress in pounds per sq. in. in the latter shall not exceed.

$$20,000 \\ 1 + \frac{l^2}{2,000b^2}$$

2200 Tons



Foshay
Tower
Minneapolis,
Minnesota



STEEL insures strength and security

DUFFIN IRON COMPANY STRUCTURAL STEEL

GENERAL OFFICES AND WORKS: 4837-55 SO. KEDZIE AVE.

PHONE LAFAYETTE 0732

SALES OFFICE: ROOM 990, 37 W. VAN BUREN ST.
CHICAGO, ILL.

PHONE HARRISON 8813-14

3300
Tons



Hall,
Lawrence
and
Ratliffe,
Inc.,
Architects

Westcott
Engineering
Company,
Engineers

Chicago Stadium

The laterally unsupported length of beams and girders shall not exceed 40 times b the width of the compression flange.

On extreme fibres of pins, when the forces are assumed as acting at the center of gravity of the pieces.. 27,000

(d) **Shearing:** On pins..... 13,500

On power-driven rivets..... 13,500

On turned bolts in reamed holes with a clearance of not more than 1/50 of an inch..... 13,500

On hand-driven rivets..... 10,000

On unfinished bolts..... 10,000

On the gross area of the webs of beams and girders, where h , the height between flanges in inches, is not more than 60 times t , the thickness of the web in inches..... 12,000

On the gross area of the webs of beams and girders if the web is not stiffened where h , the height between flanges in inches, is more than 60 times t , the thickness of the web, the maximum shear per square inch, S/A shall not exceed

$$\frac{18,000}{1 + \frac{h^2}{7,200t^2}}$$

In which S is the total shear, and A is the gross area of web in square inches.

	Double Shear	Single Shear
(e) Bearing: On pins.....	30,000	24,000
On power-driven rivets.....	30,000	24,000
On turned bolts in reamed		

holes	30,000	24,000
On hand-driven rivets.....	20,000	16,000
On unfinished bolts.....	20,000	16,000

On expansion rollers per lineal inch 600 times the diameter of the roller in inches.

(f) **Combined Stresses:** For combined stresses due to wind and other loads, the permissible working stress may be increased 33 1/3 %, provided the section thus found is not less than that required by the dead and live loads alone.

(g) **Members Carrying Wind Only:** For members carrying wind stresses only, the permissible working stresses may be increased 33 1/3 %

6. **Symmetrical Members:** Sections shall preferably be symmetrical.

7. **Beams and Girders:** (a) **Rolled beams** shall be proportioned by the moment of inertia of their net section. Plate girders with webs fully spliced for tension and compression shall be so proportioned that the unit stress on the net section does not exceed the stresses specified in section five (5) as determined by the moment of inertia of the net section.

(b) **Plate girder webs** shall have a thickness of not less than 1-160 of the unsupported distance between the flanges.

(c) **Web splices** shall consist of a plate on each side of the web capable of transmitting the full stress through the splice rivets.

(d) **Stiffeners:** Stiffeners shall be required on the webs of rolled beams and plate girders at the ends and at points of concentrated loads, and at other points where h the clear distance between flanges is greater than $85t\sqrt{18,000 (A/S)-1}$, in which t is the thickness of the web. When stiffeners are required, the distance in inches between them shall not be greater than $85t\sqrt{18,000 (A/S)-1}$, or not greater than 6 feet. When h is greater than 60 times t , the thickness of the web of a plate girder, stiffeners shall be required at distances not greater than 6 feet apart. Stiffeners under or over concentrated loads shall be proportioned to distribute such loads into the web.

(e) **Stiffeners:** Stiffeners shall be required on the webs of plate girders and the supporting framework shall be proportioned to resist the greatest horizontal stresses caused by the operation of the cranes.

(f) **Rivets** connecting the flanges to the web at points of direct load on the flange between stiffeners shall be proportioned to carry the resultant of the longitudinal and transverse shears.

(g) **Rivets** connecting the flanges to the webs of plate girders and of columns subjected to bending shall be so spaced as to carry the increment of the flange stress between the rivets.

8. **Column Bases:** (a) Proper provision shall be made to distribute the column loads on the footings and foundations.

(b) The top surface of all column bases shall be planed for the column bearing.

(c) Column bases shall be set true and level, with full bearing on the masonry, and be properly secured to the footings.

9. **Eccentric Loading:** Full provision shall be made for stresses caused by eccentric loads.

10. **Combined Stresses:** (a) Members subject to both direct and bending stresses shall be so proportioned that the greatest combined stresses shall not exceed the allowed limits.

(b) All members and their connections which are subject to stresses of both tension and compression due to the action of live loads shall be designed to sustain stress giving the largest section, with 50 % of the smaller stress added to it. If the reversal of stress is due to the action of wind, the member shall be designed for the stress giving the largest section and the connections proportioned for the largest stress.

11. **Abutting Joints:** Compression members when faced for bearings shall be spliced sufficiently to hold the connecting members accurately in place. Other joints in riveted work, whether in tension or compression, shall be fully spliced

12. **Net Sections:** (a) In calculating tension members, the net section shall be used, and in deducting the rivet holes they shall be taken 1/4 inch greater in diameter than the nominal diameter of the rivets.

(b) Pin connected tension members shall have the section through the pin hole 25 % in excess of the net section of the member, and a net section back of the pin hole equal to 75 % of that required through the pin hole.

13. **Rivets and Bolts:** (a) In proportioning rivets, the nominal diameter of the rivets shall be used.

(b) Rivets carrying calculated stresses and whose grip exceeds five diameters, shall have their number increased 1 % for each additional 1/10 inch in the rivet grip. Special care shall be used in heating and driving such rivets.

(c) Rivets shall be used for the connections of main members carrying live loads which produce impact, and for connections subject to reversal of stresses.

(d) Finished bolts in reamed holes may be used in shop or field work where it is impracticable to obtain satisfactory power-driven



FEDERAL

WELDED

WINDOWS

PIVOTED
CONTINUOUS
ARCHITECTURAL PROJECTED
COMMERCIAL PROJECTED
INDUSTRIAL DOORS
OPERATORS

BASEMENT
UTILITY

COMPLETE DETAILS
AND SPECIFICATIONS IN
SWEET'S ARCHITECTURAL CATALOG
VOLUME "A"

CATALOG FURNISHED ON REQUEST

FEDERAL STEEL SASH CO.
WAUKESHA, WISCONSIN

Chicago Office
Rooms 1111-1115 Builders Bldg., N. La Salle St., Wacker Drive
Phones: Franklin 1883—State 7911

rivets. The finished shank shall be long enough to provide full bearing, and washers used under the nuts to give full grip when turned tight.

Unfinished bolts may be used in shop or field work for connections in small structures used for shelters, and for secondary members of all structures such as purlines, girts, door and window framing, alignment bracing and secondary beams in floor.

14. Rivet Spacing:

(a) The minimum distance between centers of rivet holes shall be three diameters of the rivet; but the distance shall preferably be not less than $4\frac{1}{2}$ inches for $1\frac{1}{4}$ inch rivets, 4 inches for $1\frac{1}{2}$ inch rivets, $3\frac{1}{2}$ for 1 inch rivets, 3 inches for $\frac{3}{4}$ inch rivets, $2\frac{1}{2}$ for $\frac{5}{8}$ inch rivets, 2 inches for $\frac{1}{2}$ inch rivets, and 1 $\frac{1}{2}$ inches for $\frac{3}{8}$ inch rivets. The maximum pitch in the line of stress of compression members composed of plates and shapes shall not exceed 16 times the thinnest outside plate or shape, nor 20 times the thinnest enclosed plate or shape with a maximum of 12 inches, and at right angles to the direction of stress the distance between lines of rivets shall not exceed 30 times the thinnest plate or shape. For angles in built sections with two gage lines, with rivets staggered, the maximum pitch in the line of stress in each gage line shall not exceed 24 times the thinnest plate with a maximum of 18 inches.

(b) In tension members composed of two angles, a pitch of 3'-6" will be allowed, and in compression members, 2'-0", but the ratio l/r for each angle between rivets shall not be more than $\frac{3}{4}$ of that for the whole member.

(c) The pitch of rivets at the ends of built compression members shall not exceed four diameters of the rivets for a length equal to $1\frac{1}{2}$ times the maximum width of the member.

(d) The minimum distance from the center of any rivet hole to a sheared edge shall be $2\frac{1}{4}$ inches for $1\frac{1}{4}$ inch rivets, 2 inches for $1\frac{1}{2}$ inch rivets, $1\frac{3}{4}$ inches for 1 inch rivets, $1\frac{1}{2}$ inches for $\frac{3}{4}$ inch rivets, $1\frac{1}{4}$ for $\frac{5}{8}$ inch rivets, $1\frac{1}{8}$ for $\frac{1}{2}$ inch rivets, and 1 inch for $\frac{3}{8}$ inch rivets. The maximum distance from any edge shall be 12 times the thickness of the plate, but shall not exceed 6 inches.

15. Connections:

(a) Connections carrying calculated stresses except for lacing, sag bars, or angles, hand rails, or beam connections, shall not have less than 2 rivets; or for field connections not less than 3 rivets.

(b) Members meeting at a joint shall have their lines of center of gravity meet at a point if practicable; if not, provision shall be made for any eccentricity.

(c) The rivets at the ends of any member transmitting the stresses into that member should have their centers of gravity in the line of the center of gravity of the member; if not, provision shall be made for the effect of the resulting eccentricity. Pins may be so placed as to counteract the effect of bending due to dead load.

(d) When a beam or girder "A" is connected to another member in such a manner that "A" acts as a continuous or fixed end beam, proper provision shall be made for the bending moments at such a connection.

(e) Where stress is transmitted from one piece to another, through a loose filler, the number of rivets shall be properly increased; tight-fitting fillers shall be preferred.

16. Lattice:

(a) The open sides of compression members shall be provided with lattice having plates at each end and at intermediate points if the lattice is interrupted. Tie plates shall be as near the ends as practicable. In main members carrying calculated stresses the end tie plates shall have a length of not less than the distance between the lines of rivets con-

nnecting them to the flanges, and intermediate ones of not less than one-half of this distance. The thickness of tie plates shall not be less than one-fiftieth of the distance between the lines of rivets connecting them to the segments of the members, and the rivet pitch shall not be more than four diameters. Tie plates shall be sufficient in size and number to equalize the stress in the parts of the members.

(b) Lattice bars shall have neatly finished ends. The thickness of lattice bars shall be not less than one-fortieth for single lattice and one-sixtieth for double lattice of the distance between end rivets; their minimum width shall be as follows:

For 15" channels, or built section with $3\frac{1}{2}$ " and 4" angles— $2\frac{1}{4}$ " ($\frac{3}{4}$ " rivets), or $2\frac{1}{2}$ " ($\frac{5}{8}$ " rivets).

For 12", 10", and 9" channels, or built sections with 3" angles— $2\frac{1}{4}$ " ($\frac{3}{4}$ " rivets).

For 8" and 7" channels, or built sections with $2\frac{1}{2}$ " angles—2" ($\frac{5}{8}$ " rivets), or $2\frac{1}{4}$ " ($\frac{3}{4}$ " rivets).

For 6" and 5" channels, or built sections with 1" angles— $1\frac{1}{2}$ " ($\frac{1}{2}$ " rivets), or $1\frac{3}{4}$ " ($\frac{5}{8}$ " rivets).

(c) The inclination of lattice bars to the axis of the members shall generally be not less than 45°; but when the distance between the rivet lines in the flanges is more than 15 inches, the lattice shall be double and riveted at the intersection if bars are used, or else shall be made of angles.

(d) Lattice bars shall be so spaced that the ratio l/r of the flange included between their connections shall be not over $\frac{3}{4}$ of that of the member as a whole.

17. Expansion:

Proper provision shall be made for expansion and contraction.

18. Minimum Thickness:

No steel less than $\frac{5}{16}$ inch thick shall be used for exterior construction, nor less than $\frac{3}{4}$ inch for interior construction, except for linings or fillers and rolled structural shapes.

These provisions do not apply to light structures such as skylights, marquees, fire-escapes, light one-story buildings or light miscellaneous steel work.

For trusses having end reactions of 35,000 pounds or over, the Gusset Plates shall be not less than $\frac{3}{8}$ inch thick.

19. Adjustable Members:

The initial stress in adjustable members shall be assumed as not less than 5,000 lbs.

20. Workmanship:

(a) All workmanship shall be equal to the best practice in modern structural shops.

(b) Drifting to enlarge unfair holes shall not be permitted.

(c) The several pieces forming built sections shall be straight and fit close together; and finished members shall be free from twists, bends, or open joints.

(d) Rolled sections, except for minor details, shall not be heated.

(e) Wherever steel castings are used, they shall be properly annealed.

(f) **Punching:** Material may be punched $\frac{1}{16}$ inch larger than the nominal diameter of the rivets, whenever the thickness of the metal is equal to or less than the diameter of the rivets, plus $\frac{1}{8}$ inch. When the metal is thicker than the diameter of the rivet, plus $\frac{1}{8}$ inch, the holes shall be drilled, or sub-punched and reamed.

(g) Rivets are to be driven hot, and wherever practicable, by power. Rivet heads shall be of hemispherical shape and uniform size throughout the work for the same size rivet, full, neatly finished, and concentric with the holes. Rivets, after driving, shall be tight, completely filling the holes, and with heads in full contact with the surface.

(h) Compression joints depending upon

Facts You Ought to Know

All sheet steel, structural steel and reinforcing bars used in this giant skyscraper were produced by Inland Steel Company.



Straus Building
Chicago

INLAND COPPER ALLOY STEEL SHEETS are used extensively for all types of sheet metal work where durability is essential because *unbiased* scientific tests prove they are unsurpassed in resisting corrosion.

INLAND OPEN HEARTH STRUCTURAL STEEL is the framework of scores of mammoth office buildings and bridges throughout the Middle West.

INLAND DEFORMED BARS are preferred for concrete reinforcement by many leading architects and builders.

BRANCH
OFFICES
KANSAS CITY
MILWAUKEE
ST. LOUIS
ST. PAUL

INLAND STEEL COMPANY

38 South Dearborn Street
Chicago

WORKS
INDIANA HARBOR
INDIANA
CHICAGO HEIGHTS
ILLINOIS
MILWAUKEE
WISCONSIN

SHEETS ~ BARS ~ PLATES ~ SHAPES ~ RAILS ~ TRACK ACCESSORIES ~ RIVETS ~ BILLETS

contact bearing shall have the bearing surfaces truly faced after the members are riveted. All other joints shall be cut or dressed true and straight, especially where exposed to view.

(i) The use of a burning torch is permissible if the burned metal is not carrying stresses during the burning. Stresses shall not be transmitted into the metal through a burned surface.

21. **Painting:**

(a) Parts not in contact, but inaccessible after assembling shall be properly protected by paint.

(b) All steel work, except where encased in concrete, shall be thoroughly cleaned and given one coat of acceptable metal protection well work into the joints and open spaces.

(c) Machine finished surfaces shall be protected against corrosion.

(d) Field painting is a phase of maintenance, but it is important that unless otherwise properly protected, all steel work shall after erection be protected by a field coat of good paint applied by a competent painter.

22. **Erection:**

(a) The frame of all steel skeleton buildings shall be carried up true and plumb, and temporary bracing shall be introduced wherever necessary to take care of all loads to which the structure may be subjected, including erection equipment, and the operation

of same. Such bracing shall be left in place as long as may be required for safety.

(b) As erection progresses the work shall be securely bolted up to take care of all dead load, wind and erection stresses.

(c) Wherever piles of material, erection equipment, or other loads are carried during erection, proper provision shall be made to take care of stresses resulting from the same.

(d) No riveting shall be done until the structure has been properly aligned.

(e) Rivets driven in the field shall be heated and driven with the same care as those driven in the shop.

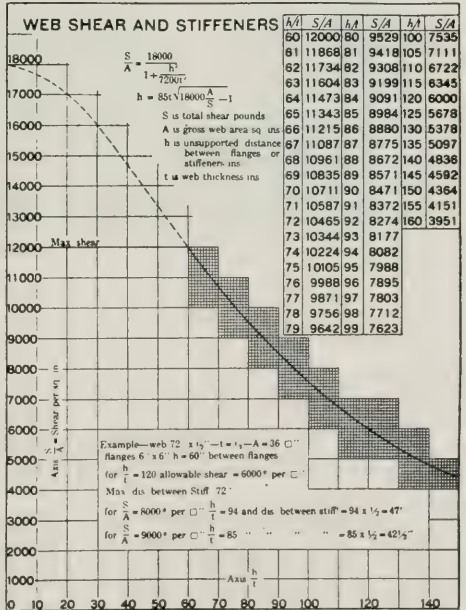
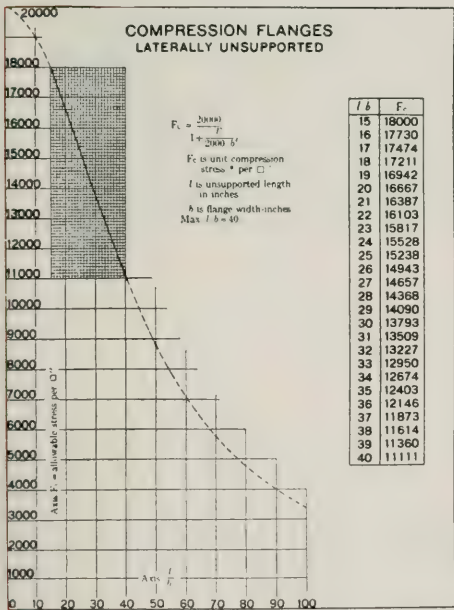
23. **Inspection:**

(a) Material and workmanship at all times shall be subject to the inspection of experienced engineers representing the purchaser.

(b) Material or workmanship not conforming to the provisions of this Specification shall be rejected at any time defects are found during the progress of the work.

(c) The Contractor furnishing such material or doing such work shall promptly replace the same.

(d) All inspection as far as possible shall be made at the place of manufacture, and the Contractor or Manufacturer shall co-operate with the Inspector, permitting access for inspection to all places where work is being done.

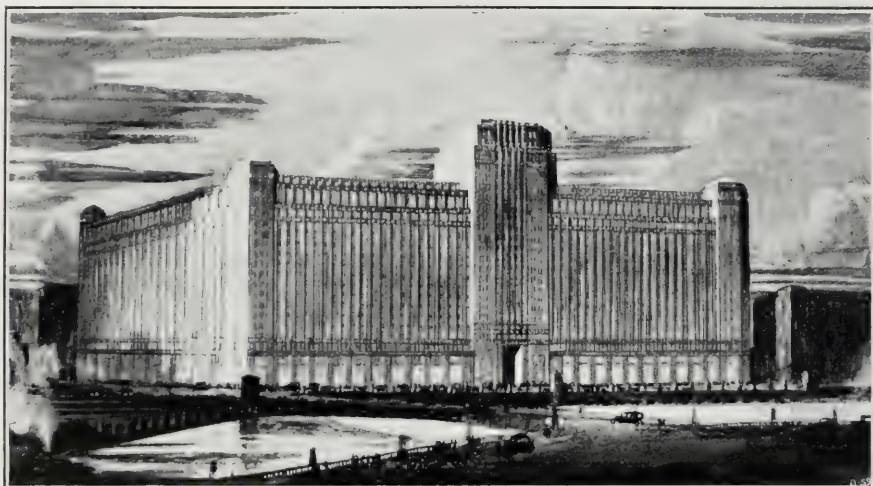


(Continued on page 445)

CHAS. JOHNSON & SON FIRE ESCAPE CO.

Established 1872

Phones: Kedzie 0205-0206



Merchandise Mart, Chicago, Ill.

Graham, Anderson, Probst & White, Architects

Manufacturers of

LADDER AND STAIRWAY FIRE ESCAPES

859-63 N. Spaulding Avenue

CHICAGO

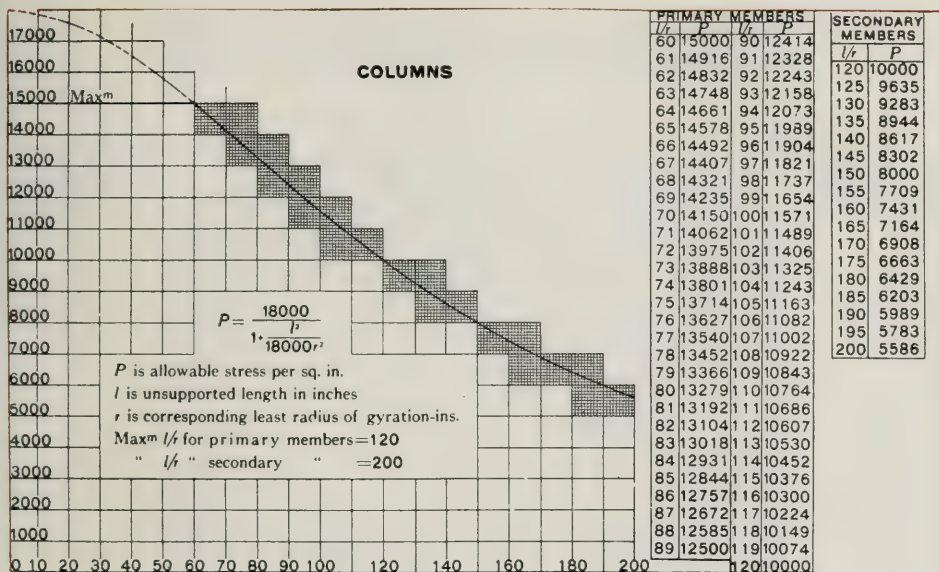


TABLE OF COMPARATIVE STEEL PRICES

1900—1929

YEAR	FIG. IRON No. 2 FOUNDRY Price per gross ton—delivered Chicago		BESSEMER BILLETS Price per gross ton—delivered Chicago		STEEL SKELETONS Price per net ton—delivered Chicago		40 STOCKS	
	High	Low	High	Low	High	Low	High	Low
1900.....	\$23.85	\$14.70	\$38.00	\$19.50				
1901.....	16.00	14.50	30.50	22.70				
1902.....	23.35	16.00	35.50	30.50	\$64.20	48.60		
1903.....	23.45	14.50	33.50	26.00	52.40	42.20		
1904.....	17.70	13.50	26.00	22.50	51.80	42.20	\$ 85.00	\$58.00
1905.....	19.60	16.50	29.00	25.00	58.70	54.00	100.00	79.00
1906.....	25.85	18.50	32.50	29.00	54.00	44.00	114.00	99.00
1907.....	26.85	18.40	33.30	31.00	56.60	53.60	111.00	67.00
1908.....	18.75	17.05	31.00	28.00	71.00	45.60	91.00	68.00
1909.....	19.30	16.70	30.50	26.00	54.80	40.00	106.00	88.00
1910.....	19.30	15.80	30.50	26.00	52.00	44.00	104.00	78.00
1911.....	15.80	14.30	26.00	22.20	44.00	39.40	95.00	82.00
1912.....	18.30	14.30	30.00	22.75	49.60	36.40	102.00	89.00
1913.....	18.50	14.20	31.50	23.00	61.20	46.60	94.00	77.00
1914.....	14.75	13.00	24.00	22.16	48.60	37.26	88.00	68.00
1915.....	19.00	13.30	34.16	22.16	59.00	34.10	102.00	72.00
1916.....	30.50	18.50	63.16	35.16	94.00	63.80	109.00	92.00
1917.....	55.50	30.50	103.16	50.66	105.00	95.00	102.00	68.00
1918.....	34.50	31.50	52.00	48.00	119.00	91.00	91.00	70.00
1919.....	40.50	27.25	52.40	43.00	110.00	79.00	100.00	80.00
1920.....	46.70	33.70	69.30	49.52	122.60	92.00	111.00	58.00
1921.....	32.70	18.95	49.52	35.02	83.60	48.00	78.00	65.00
1922.....	32.60	23.70	45.42	34.02	90.00	46.00	99.00	77.00
1923.....	32.60	23.10	50.42	40.92	120.00	71.00	98.00	82.00
1924.....	25.10	20.10	45.42	35.50	89.00	67.50	110.00	85.00
1925.....	24.60	20.60	37.00	35.00	75.00	64.00	135.00	104.00
1926.....	23.60	21.60	35.00	35.00	79.00	65.00	144.00	118.00
1927.....	21.60	19.10	35.00	33.00	68.00	58.00	172.00	136.00
1928.....	20.60	18.10	33.00	32.00	67.00	57.00	.....	.....
1929, Nov. 1....	20.60	20.60	36.00	33.00	68.00	61.00	.....	.....

Concrete Rib Floor Construction



The **MERCHANDISE MART**—CHICAGO

A good yardstick by which to measure the responsibility of an organization is the service which it is called upon to render.

Co-operating with Graham, Anderson, Probst & White Co., Architects, and John Griffiths & Son Co., Contractors, the Concrete Engineering Company will install in this "Colossus of Market Places" the Steelform equipment for 50 acres of floor area having open or suspended ceilings.

CONCRETE ENGINEERING COMPANY

General Offices: Omaha, Nebraska

Chicago Sales Office—First National Bank Bldg.

Telephone: Randolph 6877

Chicago Warehouse Office—1926 So. 52nd Ave.

Telephone: Crawford 2510

Other Offices and Warehouses: Detroit Milwaukee Minneapolis St. Paul
Des Moines Kansas City St. Louis Houston San Antonio Dallas
Oklahoma City Los Angeles Pittsburgh Oakland San Francisco

MEYER

Steelforms

THE STANDARD

THE ORIGINAL REMOVABLE STEEL FORMS FOR CONCRETE RIB FLOOR CONSTRUCTION—Also CECO REINFORCING AND FIREPROOFING MATERIALS

STANDARD SPECIFICATIONS FOR BILLET-STEEL CONCRETE REINFORCEMENT BARS

Serial Designation: A 15—14.

The specifications for this material are issued under the fixed designation A 15; the final number indicates the year of original issue, or in the case of revision, the year of last revision.

Adopted, 1911; Revised, 1912, 1913, 1914.

(1) (a) These specifications cover three classes of billet-steel concrete reinforcement bars, namely: plain, deformed, and cold-twisted.

(b) Plain and deformed bars are of three grades, namely: structural-steel, intermediate and hard.

2. (a) The structural-steel grade shall be used unless otherwise specified.

(b) If desired, cold-twisted bars may be purchased on the basis of tests of the hot-rolled bars before twisting, in which case such tests shall govern and shall conform to the requirements specified for plain bars of structural-steel grade.

I. Manufacture.

3. (a) The steel may be made by the Bessemer or the open-hearth process.

(b) The bars shall be rolled from new billets. No rerolled material will be accepted.

4. Cold-twisted bars shall be twisted cold with one complete twist in a length not over 12 times the thickness of the bar.

II. Chemical Properties and Tests.

5. The steel shall conform to the following requirements as to chemical composition:

Phosphorus
Bessemer.....not over 0.10 per cent
Open-hearth.... " " 0.05 "

6. An analysis to determine the percentages of carbon, manganese, phosphorus and sulfur, shall be made by the manufacturer from a test ingot taken during the pouring of each melt, a copy of which shall be given to the purchaser or his representative. This analysis shall conform to the requirements specified in Section 5.

7. Analysis may be made by the purchaser from finished bars representing each melt of open-hearth steel, and each melt, or lot of ten tons, of Bessemer steel, in which case an excess of 25 per cent above the requirements specified in Section 5 shall be allowed.

III. Physical Properties and Tests.

8. (a) The bars shall conform to the following requirements as to tensile properties:

Tensile Properties.

Properties Considered.	Plain Bars.			Deformed Bars.			
	Structural-Steel Grade.	Intermediate Grade.	Hard Grade.	Structural-Steel Grade.	Intermediate Grade.	Hard Grade.	Cold-twisted Bars.
Tensile strength, lb. per sq. in....	55,000 to 70,000	70,000 to 85,000	80,000 min.	55,000 to 70,000	70,000 to 85,000	80,000 min.	Recorded only.
Yield point, min., lb. per sq. in....	33,000	40,000	50,000	33,000	40,000	50,000	55,000
Elongation in 8 in. min., per cent..	1,400,000*	1,300,000*	1,200,000*	1,250,000*	1,125,000*	1,000,000*	5
	Tens. str.	Tens. str.	Tens. str.	Tens. str.	Tens. str.	Tens. str.	

(b) The yield point shall be determined by the drop of the beam of the testing machine.

9. (a) For plain and deformed bars over $\frac{3}{4}$ in. in thickness or diameter, a deduction of 1 from the percentages of elongation specified in Section 8 (a) shall be made for each increase of $\frac{1}{4}$ in. in thickness or diameter above $\frac{3}{4}$ in.

(b) For plain and deformed bars under $\frac{7}{16}$ in. in thickness or diameter, a deduction of 1 from the percentages of elongation specified in Section 8 (a) shall be made for each decrease of $\frac{1}{16}$ in. in thickness or diameter below $\frac{7}{16}$ in.

10. The test specimen shall bend cold around a pin without cracking on the outside of the bent portion, as follows:

Bend-Test Requirements.

Thickness or Diameter of Bar.	Plain Bars.			Deformed Bars.			Cold-twisted Bars.
	Structural-Steel Grade.	Intermediate Grade.	Hard Grade.	Structural-Steel Grade.	Intermediate Grade.	Hard Grade.	
Under $\frac{3}{4}$ in....	180 deg. d=t	180 deg. d=2t	180 deg. d=3t	180 deg. d=t	180 deg. d=3t	180 deg. d=4t	180 deg. d=2t
$\frac{3}{4}$ in. or over...	130 deg. d=t	90 deg. d=2t	90 deg. d=3t	90 deg. d=2t	90 deg. d=3t	90 deg. d=4t	180 deg. d=3t

Explanatory Note: d=the diameter of pin about which the specimen is bent; t=the thickness or diameter of the specimen.

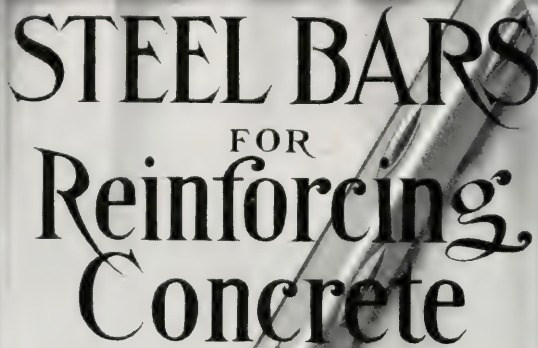
11. (a) Tension and bend test specimens for plain and deformed bars shall be taken from the finished bars, and shall be of the full thickness or diameter of bars as rolled; except that the specimens for deformed bars may be machined for a length of at least 9 in., if deemed necessary by the manufacturer to obtain uniform cross-section.

(b) Tension and bend test specimens for cold-twisted bars shall be taken from the

finished bars, without further treatment; except as specified in Section 2 (b).

12. (a) One tension and one bend test shall be made from each melt of open-hearth steel, and from each melt, or lot of ten tons, of Bessemer steel; except that if material from one melt differs $\frac{1}{4}$ in. or more in thickness or diameter, one tension and one bend test shall be made from both the thickest and the thinnest material rolled.

*See Section 9.



STEEL BARS FOR Reinforcing Concrete

PLAIN AND
DEFORMED
ROUNDS AND
SQUARES

Shipments
from Stock
and Mill
Rolling

OUR
SERVICE

—
ESTIMATING

—
SETTING AND
BENDING DETAILS

—
BENDING



CALUMET STEEL COMPANY

55 NORTH LA SALLE STREET
CHICAGO

(b) If any test specimen shows defective machining or develops flaws, it may be discarded and another specimen substituted.

(c) If the percentage of elongation of any tension test specimen is less than that specified in Section 8 (a) and any part of the fracture is outside the middle third of the gage length, as indicated by scribe scratches marked on the specimen before testing, a retest shall be allowed.

IV. Permissible Variations in Weight.

13. The weight of any lot of bars shall not vary more than 5 per cent from the theoretical weight of that lot.

V. Finish.

14. The finished bars shall be free from injurious defects and shall have a workman-like finish.

VI. Inspection and Rejection.

15. The inspector representing the purchaser shall have free entry, at all times while work on the contract of the purchaser is being performed, to all parts of the manufacturer's works which concern the manu-

facture of the bars ordered. The manufacturer shall afford the inspector, free of cost, all reasonable facilities to satisfy him that the bars are being furnished in accordance with these specifications. All tests (except check analyses) and inspection shall be made at the place of manufacture prior to shipment, unless otherwise specified, and shall be so conducted as not to interfere unnecessarily with the operation of the works.

16. (a) Unless otherwise specified, any rejection based on tests made in accordance with Section 7 shall be reported within five working days from the receipt of samples.

(b) Bars which show injurious defects subsequent to their acceptance at the manufacturer's works will be rejected, and the manufacturer shall be notified.

17. Samples tested in accordance with Section 7, which represent rejected bars, shall be preserved for two weeks from the date of the test report. In case of dissatisfaction with the results of the tests, the manufacturer may make claim for a rehearing within that time.

STANDARD SPECIFICATIONS FOR RAIL STEEL CONCRETE REINFORCEMENT BARS

As Adopted by American Society for Testing Materials, Philadelphia, Pa., U. S. A., 1913.

Serial Designation A-16-14.

Classes.

1. These specifications cover three classes of rail-steel concrete reinforcement bars, namely: plain, deformed, and hot-twisted.

I. MANUFACTURE.

Process.

2. The bars shall be rolled from standard section Tee rails.

Hot-twisted Bars.

3. Hot-twisted bars shall have one complete twist in a length not over 12 times the thickness of the bar.

II. PHYSICAL PROPERTIES AND TESTS.

4. (a) The bars shall conform to the following minimum requirements as to tensile properties:

Properties Considered.	Plain Bars.	Deformed and Hot-twisted bars.
Tensile strength, lb. per sq. in.....	80,000	80,000
Yield point, lb. per sq. in.....	50,000	50,000
Elongation in 8 in., per cent*.....	1,200,000	1,000,000
	Tens. str.	Tens. str.

* See Section 5.

(b) The yield point shall be determined by the drop of the beam of the testing machine.

Modification in Elongation.

5. (a) For bars over ¾ in. in thickness or diameter, a deduction of 1 from the percentages of elongation specified in Section 4 (a) shall be made for each increase of ¼ in. in thickness or diameter above ¾ in.

(b) for bars under 7-16 in. in thickness or diameter, a deduction of 1 from the percentages of elongation specified in Section 4 (a) shall be made for each decrease of 1-16 in. in thickness or diameter below 7-16 in.

Bend Tests.

6. The test specimen shall bend cold around a pin without cracking on the outside of the bent portion, as follows:

Bend Test Requirements.

Thickness or Diameter of Bar.	Plain Bars.	Deformed and Hot-twisted bars.
	180 deg.	180 deg.
Under ¾ in.....	d = 3 t	d = 4 t
	90 deg.	90 deg.
¾ in. or over.....	d = 3 t	d = 4 t

Explanatory Note: d = the diameter of pin about which the specimen is bent; t = the thickness or diameter of the specimen.

Test Specimens.

7. (a) Tension and bend test specimens for plain and deformed bars shall be taken from the finished bars, and shall be of the full thickness or diameter of bars as rolled, except that the specimens for deformed bars may be machined for a length of at least 9 in., if deemed necessary by the manufacturer to obtain uniform cross-section.

(b) Tension and bend test specimens for hot-twisted bars shall be taken from the finished bars, without further treatment.

Number of Tests.

8. (a) One tension and one bend test shall be made from each lot of ten tons or less of each size of bar rolled from rails varying not more than 10 lb. per yd. in nominal weight.

(b) If any test specimen shows defective machining or develops flaws, or if a tension test specimen breaks outside the middle third of the gage length, it may be discarded and another specimen substituted.

III. PERMISSIBLE VARIATIONS IN WEIGHT.

Permissible Variations.

9. The weight of any lot of bars shall not vary more than 5 per cent from the theoretical weight of that lot.



Woodbridge PresTeel Stairways

These stairways are designed according to present day Building demands—clean-cut in appearance, sturdy, with every detail showing quality of workmanship.

Tested for Strength

Woodbridge PresTeel Stairways are Tested for Strength Stairways. All materials and all designs are adopted only after passing severest tests of structural engineers.

Built on Engineering Standards

Engineering principles are applied in all our manufacturing. Our engineers have accurate technical information based on years of special stairway research.

For All Types of Buildings

Designs are available for all types of buildings, from a two-story apartment to the largest sky-scraper—including circular stairways.

Guaranteed Without Reservation

PresTeel-Tested for Strength-Stairways are guaranteed without reservation.

Woodbridge Catalog No. 30, showing hundreds of illustrations and giving much technical information, will be forwarded prepaid upon request.

Woodbridge Ornamental Iron Co.

1515 ALTGELD STREET : CHICAGO, ILLINOIS

Incorporated 1913

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

CODE OF PRACTICE

PREFACE.

Since the use of structural steel came into existence about thirty-five years ago, there has developed an industry engaged in the fabrication and erection of this material which at the present time is annually furnishing over \$300,000,000 worth of material to the public.

During this period of evolution it is obvious that many inconsistent practices should have come into existence, and the American Institute of Steel Construction, representing the industry between the rolling mills and the buying public, has undertaken the codifying of the various conditions, with a view of establishing uniform practice.

The Institute's Specification on the design, fabrication, and erection of structural steel has been received with widespread approval, and this Code of Standard Practice is now being issued to cover conditions not touched in the Specification.

(a) **Scope.** The rules and practices hereafter defined are adopted by the American Institute of Steel Construction as standard for the industry and shall govern all conditions where the contract between the buyer and seller does not specify otherwise and where they do not conflict with local or state requirements.

Section 1. Design.

(b) Unless otherwise specified or required, the design, fabrication and erection of structural steel shall conform to the Standard Specification of the American Institute of Steel Construction for buildings, dated June 1, 1923, or as amended to date.

Section 2. Classification.

(a) General.

The steel and iron items entering into the construction of a structure are divided into the following classes:

- CLASS "A"—Structural Steel and Iron
- CLASS "B"—Ornamental Steel and Iron
- CLASS "C"—Steel Floor Joists
- CLASS "D"—Miscellaneous Steel and Iron

In contracting to furnish the material for a structure where the material to be furnished is designated as structural steel and iron, ornamental steel and iron, steel floor joists, or miscellaneous steel and iron, the Seller will furnish only such items under each classification as are listed below, and no other items will be included unless by special understanding. In cases where materials in excess of minimum requirements are furnished to provide for waste or loss, all unused material remaining after completion of work shall be the property of the Seller and returned to him.

(b) Class "A" Structural Steel and Iron.

Contracts taken to furnish the structural steel and iron for a building are based on furnishing the following items only:

- Anchor bolts for structural steel only
- Bases of steel or iron only
- Beams of rolled structural steel
- Bearing plates for structural steel
- Brackets made of structural steel shapes
- Channels of rolled structural steel
- Channels and angle-supports only for suspended ceilings where they attach to structural steel but not including small channel or angle furring.
- Columns, structural steel, cast iron and pipe
- Girders of structural steel

- Grillage, beams and girders (structural steel)
- Hangers of structural steel
- Lintels as shown or enumerated
- Marquise (structural frame only)
- Rivets and bolts for field connections, as follows:

1. The Seller shall furnish sufficient rivets of suitable size, plus at least 10% to cover waste for all field connections of steel to steel which are designated as riveted field connections.

2. The Seller shall furnish sufficient bolts of suitable size, plus 5% to cover waste for all field connections of steel to steel which are designated to be bolted unless specifically called for.

3. No fitting-up bolts or washers will be included.

Separators, angles, tees, clips, bracing and detail fittings in connection with structural steel frame.

Tie rods.

Trusses of structural steel.

Unless specifically agreed to in the contract, the Seller of the structural steel will not provide field connections or field holes for the ornamental steel and iron, the miscellaneous steel and iron, nor the materials for any other trades.

(c) Class "B" Ornamental Steel and Iron.

Contracts taken to furnish the ornamental steel and iron for a building are based on furnishing the following items only:

All Bronze and Brass work, except hardware fittings

- Balconies
- Cast Iron Cornices
- Curtain Guides
- Elevator fronts and enclosures
- Grilles and gratings
- Iron store fronts
- Lamp standards and brackets
- Marquise (steel or iron, except frame) see Class "A"
- Ornamental brackets, steel or iron
- Ornamental inside stairs, steel or iron
- Ornamental outside steel or iron stairs, including fire escapes
- Safety treads
- Railings (gas pipes, ornamental or brass)
- Sills and thresholds (brass, steel or iron)
- Spiral stairs, steel or iron
- Window sills and frames, steel or iron
- Wire work, ornamental steel or iron

(d) Class "C"—Steel Floor Joists.

Contracts taken to furnish the steel floor joists for a building are based on furnishing the following items only:

Steel Joists which are not a part of the structural steel frame for the building, and which are devised to carry the floor or roof panels.

Bracing and bridging for floor joists; clips for fastening floor joists.

Stirrup and Hanger for Floor Joists.

Ties for floor joists.

(e) Class "D" Miscellaneous Steel and Iron.

The nature and character of the material of this classification makes it impossible to cover all items and it is recommended that the Seller taking the contract to furnish the miscellaneous steel and iron work for a building specify all items in detail which



Oriental Theatre

C. W. & Geo. L. Rapp, Architects

GUARANTY IRON AND STEEL CO.

Ornamental Iron and Bronze

3841 to 3863 WEST LAKE STREET
CHICAGO

Telephones VANburen 6015, 6016, 6017, 6018 and 6019

it is intended to furnish. The general list of items under this classification is as follows:

Area gratings
Cast iron cover and frames
Cast iron rainwater receivers
Cast iron downspout shoes
Cleanouts
Coal chutes
Column guards
Door frames and bucks
Foot scrapers
Furnace or fireplace dampers
Flag pole
Ladders
Pin rails
Sidewalk doors
Sills and curb angles, and anchors for same
Special bolts or anchors where distinctly shown on the plans
Stairs made of plain structural steel—not including treads of other materials

Stacks
Steel and cast iron platforms
Steel or iron chimney caps
Thimbles
Wall plate anchors
Wheel guards
Window guards
Wire screens for partitions, door and window guards (this does not include fly screens)

(f) **Materials Not Classed Under the Above Headings.**

The following items are not covered by classifications A, B, C, and D, and will in no case be furnished by the Seller unless specifically agreed to and mentioned in the contract. It is not possible to designate every detail, and the list is typical of material not included in classification A, B, C, and D. It is shown here to assist the Architect and Engineer in avoiding confusion:

Ash hoists
Awning boxes
Boilers
Elevators or accessories
Elevator guides or sheave beams
Expanded metal
Furring
Glass for any purpose whatever
Hollow metal doors or frames
Hoppers
Mail chutes
Metal lockers
Miscellaneous carpenter or masonry bolts for connecting wood to wood, steel to wood, or wood to stone, etc.
Name plates
Patented devices
Pilot and driving nuts
Reinforcing steel
Rolling doors
Sheet metal work or corrugated sidings and roofing
Sidewalk lights
Steel sash and steel sash partitions
Spiral slides
Suspended ceiling, except as noted under Class "A"
Tanks and pans
Toilet partitions
Treads, except steel or iron
Vault doors
Ventilating brick

Wall, ceiling and floor registers
Wood handrails
Wood handrail brackets
And all other material not mentioned.

Section 3. Invoicing.

When conditions make it possible to award contracts on a lump sum basis, the confusion of determining weights will be avoided. Scale weights involve a variation which frequently lead to a compromise based on calculated weights.

The rules hereafter established, while not giving exact weights, are the basis upon which the Seller must make a lump sum or a pound price bid, and they eliminate the necessity of increased cost of shop drawings and other refinements of manufacture which would very materially increase costs if exact weights were required.

(a) **Weights:** Structural steel and iron sold at a unit price per pound, hundred weight (100 lbs.) or ton (2,000 lbs.) shall be invoiced on the calculated weights of shapes, plates, bars, castings, rivets and bolts, based on the detailed shop drawings and shop bills as follows:

1. **Dimensions:** The weight will be figured on the basis of rectangular dimensions for all plates, and overall dimensions for all structural shapes, and with no deductions for copes, clips, sheared edges, punchings, borings, milling or planing. When plates can be economically cut in multiples out of one large rectangular plate, then the calculated weight of the plates shall be determined by the area of the large plate

2. **Over-run.**

(a) To the nominal theoretical weights of all sheared plates will be added one-half the allowance for overrun in weights in accordance with the Specifications of the American Society for Testing Materials.

(See tables in A. S. T. M. Specifications).

(b) Reinforcing bars when not sold on a basis of scale weights shall be invoiced by the Seller at the theoretical weight plus 1½% to allow for overrun weight of deformations, etc.

(c) To the theoretical weight of all castings shall be added 10% to cover average overrun.

3. **Rivets.**

(a) The weight of shop rivets will be based on the weights shown in the following table:

	Per 100 Rivets
1. Rivets ¼" in diameter.....	20 lbs.
2. Rivets ⅝" in diameter.....	30 lbs.
3. Rivets ¾" in diameter.....	50 lbs.
4. Rivets 7⁄8" in diameter.....	100 lbs.
5. Rivets 1" in diameter.....	150 lbs.
6. Rivets 1 1⁄8" in diameter.....	250 lbs.
7. Rivets 1 1⁄4" in diameter.....	325 lbs.

(b) Field rivets and bolts shall be invoiced at their actual weight.

4. **Paint:** One-half of 1% of the theoretical weights of the material painted will be added for each coat of shop paint. For work oiled, one-fourth of 1% for each coat will be added.

Section 4. Drawings and Specifications.

(a) The Buyer shall furnish the Seller within a time agreed to in the contract a survey of the lot lines, together with a complete and full design of the structural steel frame definitely locating all openings, levels, etc., and showing all material to be furnished by the Seller with such information as may be necessary for the completion of the shop drawings by the Seller. All such information and drawings shall be consistent with the original drawings and specifications.

(b) In cases of discrepancies between the drawings and the specifications prepared by either the Seller or the Buyer, the



Jackson City Bank, Jackson, Mich.

Weary & Alford, Designers.

Western Architectural Iron Co.

ORNAMENTAL IRON AND STEEL STAIRS

Telephone Independence 1500

3455 Elston Ave. Chicago, Ill.

specifications shall govern; and in case of discrepancies between the scaled dimensions on the drawings and the figures written on them, the figures shall govern. Should the Seller in the execution of his work find discrepancies in information furnished by the Buyer, he shall refer such discrepancies to the Buyer before proceeding further with work which would be affected.

(c) Shop Drawings shall be made and submitted to the representative of the Buyer, who shall examine the same and return them approved with such corrections as he finds necessary. They shall be corrected by the Seller if necessary and returned for the Buyer's file as finally approved. The Seller may proceed with shop work, but in so doing, he shall assume responsibility for having properly made the corrections indicated by the Buyer.

(d) Shop Drawings prepared by the Seller and approved by a representative of the Buyer shall be deemed the correct interpretation of the work to be done, but does not relieve the Seller of responsibility for the accuracy of details.

(e) After the plans and shop drawings have been "approved" or "approved as noted" by the authority designated in the contract, any further changes required shall be made at the expense of the Buyer.

(f) When detailed shop drawings are furnished by the Buyer no responsibility for misfits due to errors in the drawings will be assumed by the Seller.

Section 5. Good Workmanship and Standard Practice.

Good workmanship and standard practice in a modern structural shop is defined as follows:

(a) **Material:** Stock material shall be of a quality substantially equal to that called for by the specifications of the American Society for Testing Material for the classification covering its intended use; and mill test reports shall constitute sufficient record as to the quality of material carried in stock. It is obviously impossible for the Seller to maintain records of heat or blow numbers of every piece of material in his stock, and the same shall not be required if all his stock purchases are made under an established specification as to grade and quality.

Whenever a shop maintains such a practice in carrying a stock of material, it is deemed good practice to permit the use of such stock material in its fabricating operations whenever the shop desires to do so, instead of ordering items from the mill for a specific operation. Stock materials bought under no particular specifications, or under specifications materially less rigid than those mentioned above, or stock material which has not been subject to mill or other recognized test reports, shall not be used, except as noted below, without the approval of the Buyer and under rigid inspection.

It is permitted to use unidentified stock material free from surface imperfections for short sections of minor importance or for small unimportant details, where the quality of the material could not affect the strength of the structure.

(b) **Straightening:** All material shall be straight, and if straightening or flattening is necessary, it shall be done by a process that will not injure the material. Sharp kinks or bends shall be cause for rejection.

(c) **Punching:** The punch shall be $\frac{1}{16}$ " larger than the nominal diameter of the rivet, and the die opening not more than $\frac{1}{16}$ " larger than the diameter of the punch. The thickness of the material in punched work shall not be greater than nominal diameter of the rivet, plus $\frac{1}{16}$ ". The accuracy of the punching shall be such that for any group of holes when assembled, 75% shall admit a rod equal to the diam-

eter of the cold rivet at right angles to the plane of the connection, otherwise the holes shall be reamed.

Likewise, when work is assembled, all holes which will not admit a rod $\frac{1}{16}$ " smaller than the nominal diameter of the cold rivet shall be reamed.

(d) **Reaming:** Reamed or drilled holes shall not be required unless specifically agreed to in the contract. When specifications require that work shall be sub-punched and reamed, the die used for punching shall be $\frac{1}{16}$ " smaller than the nominal diameter of the rivet, and the assembled holes shall be reamed to a diameter of $\frac{1}{16}$ " larger than the nominal diameter of the rivet.

(e) **Planing:** Planing or finishing of sheared plates or shapes will not be required unless specifically called for by the specifications or drawings.

(f) **Assembling:** All parts of riveted members shall be well pinned or bolted and rigidly held together while riveting. Drifting done during assembling shall not distort the metal to enlarge the hole on the side on which the die was used in punching.

Finished members shall be true to line and free from twists, bends and open joints. It is not the function of fitting up bolts to bring improperly straightened material into place, thus causing a strain on the rivets in the finished work.

Compression members shall not have a lateral variation greater than 1 to 1000 of the axial length between the points which are to be laterally supported.

An allowable variation of $\frac{1}{32}$ " is permissible in the overall length of members with both ends milled.

Members without milled ends which are to be assembled to other steel parts of the structure shall not have an error greater than $\frac{1}{16}$ " for members 30 feet or less in length, and not more than $\frac{1}{8}$ " for members over 30 feet in length.

(g) **Riveting:** Rivets shall be heated uniformly to a light cherry red, and shall be driven and the heads formed with a proper sized die while hot. When heated and ready for driving, rivets shall be free from slag scale, and carbon deposits. When driven they shall completely fill the holes.

Loose, burned or otherwise defective rivets shall be replaced. After driving, the rivet heads, shall be full, neatly made, concentric with the rivet hole, and in full contact with the surface of the member. Caulking the rivet head shall not be permitted.

(h) **Burning Torch:** The use of a burning torch is permissible if the burned metal is not carrying stresses during the burning. Stresses shall not be transmitted into the metal through a burned surface.

The material adjacent to a burned surface for a distance equal to the thickness of the material shall not be considered a part of the net section for tension members.

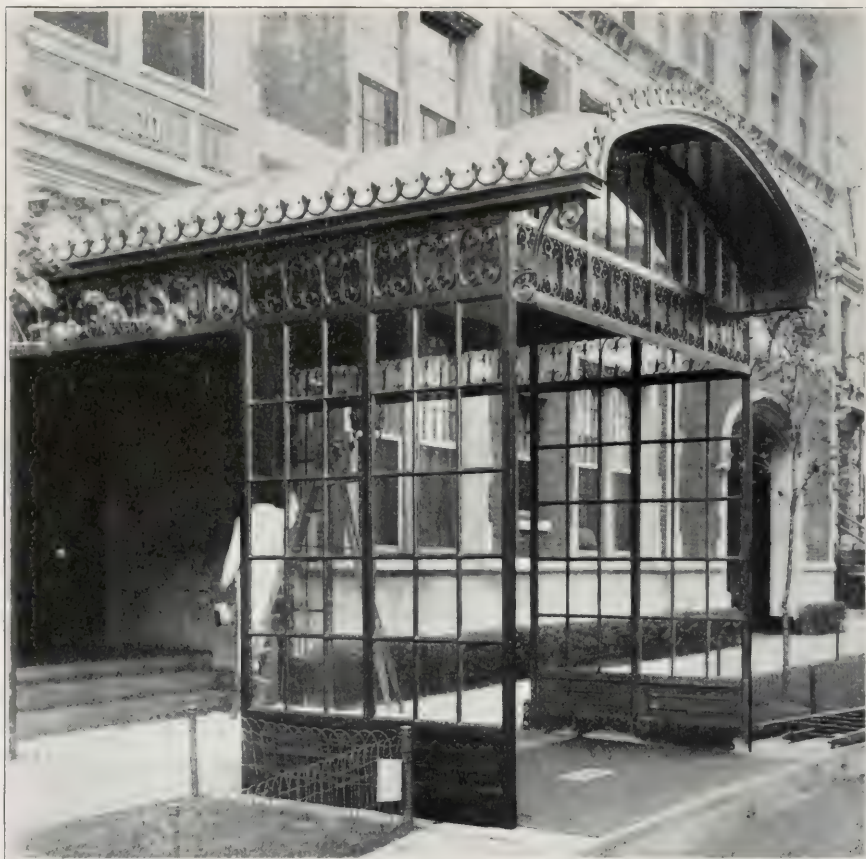
Section 6. Inspection and Delivery.

(a) **Inspection:** The Seller's shop service includes inspection by his own inspectors, and shop or mill inspection other than this shall be paid for by the Buyer, except when otherwise called for in the specification.

(b) **Acceptance of Materials:** When material is inspected by a representative of the Buyer at the shop, the acceptance of such material by the Buyer's representative shall be considered the Buyer's final approval, but the Seller shall be responsible for the accuracy of the work and for defective material or workmanship which may be discovered before the completion of the structure.

(c) **Order of Delivery:** Unless the order or sequence of delivery is specifically arranged for before the work is undertaken, it will be at the convenience of the Seller.

(d) **Materials Sold Delivered.** When material is sold delivered on cars or trucks



1120 Lake Shore Drive

Ornamental Iron, Glass and Copper Marquise

Childs & Smith, Architects

JOSEPH HALSTED COMPANY

Architectural Iron Work

West 31st Street and S. Spaulding Avenue, CHICAGO

Telephone: Crawford 2600

Iron Stairs, Elevator Doors and Enclosures, Ornamental Iron Work, Fire Escapes,
Iron Store Fronts, Iron Fences and Grilles

at the site of the structure, all unloading shall be done by the Buyer, and all responsibility to persons or property during such unloading shall be at the Buyer's risk.

(e) **Loss in Shipment where Material Is Sold Fabricated Only:** The quantity of material shown by the shipping statements will in all cases govern settlements unless notice of shortage is immediately reported to the agent of the delivering carrier, and his signed verification obtained, and like notice sent to the Seller within 48 hours after receipt of the shipment, in order that the alleged shortage may be investigated by the Seller.

(f) **Storage of Material:** Where conditions make it necessary that material be stored for any length of time, and the contract does not provide for such storage, payments are to come due and be payable the same as if the material had been delivered at the building site; and the Seller shall be compensated for handling storage, and other increased expenses as may result from such conditions.

Section 7. Erection.

(a) **Foundations:** The Seller or Erector shall not be responsible for the strength or suitability of the foundations.

(b) **Building Lines and Bench Marks:** Building Lines and Bench Marks at the site of the structure shall be accurately located by the Buyer, and carefully shown or described by him or his representative to the steel erector or his engineer.

(c) **Steel or Cast Iron Bases.** All steel grillage, slabs, or cast iron bases in bridge or building work shall be set to grade and line by the Buyer unless otherwise specifically agreed upon.

(d) **Anchor Bolts.** All anchor or foundation bolts shall be set by the Buyer.

(e) **Working Room:** The erection contractor shall be entitled to sufficient space at the site of the structure in a place convenient to him to place his derrick and other necessary erection equipment. When conditions at the site permit, he shall be entitled to storage space for enough material to keep his erection force in continuous operation.

(f) **Plumbing Up:** The temporary guys and braces shall be the property of the Seller, and if, after the steel has been plumbed and leveled, the work of completing the structure by other contractors is suspended or delayed, the owner of the temporary guys and braces shall receive reasonable compensation for their use. The guys shall be removed by the Buyer at his expense and returned to the Seller in as good condition as when placed in the building with a reasonable depreciation.

Immediately upon completion by the steel erector, the Buyer shall assure himself by whatever agencies he may elect, that the steel erector's work is plumb and level, and properly guyed. If it is not, he should immediately notify the erector and direct him to perfect his work. After the steel erector has guyed and plumbed the work once to the satisfaction of the Buyer, his responsibility ceases. Any further work in guying or plumbing shall be performed entirely at the Buyer's expense.

In the setting or erecting of structural steel work, the individual pieces shall be considered plumb or level where the error does not exceed 1 to 500.

For exterior columns and columns adjacent to elevator shafts of multiple story buildings, the error from plumb shall not exceed 1 to 1000 for the total height of the column.

(g) **Opportunity to Investigate Errors:** Correction of minor misfits and a reasonable amount of reaming and cutting of excess stock from rivets will be considered as a legitimate part of erection. Any error in shop work which prevents the proper as-

sembling and fitting up of parts by the moderate use of drift pins, or a moderate amount of reaming and slight chipping or cutting, shall immediately be reported to the Seller and his approval of the method of correction obtained.

(h) **Wall Plates:** All loose masonry bearing plates for beams, lintels, trusses or columns shall be set to grade and line by the Buyer ready for the steel erector to set his work.

(i) **Loose Lintels:** Loose Lintels or pieces of all kinds and descriptions required by the design of a building to carry brick work over openings, and which lintels or pieces are not attached in any way to the rest of the steel structure, and cannot be placed except as the masonry work advances, will not be erected by the steel erector unless by special agreement.

(j) **Ornamental Iron and Bronze:** Fine ornamental iron and bronze work is considered as finishing material, and shall not be set in a building until after the marble, plaster, and other work, except decorating, is in place.

(k) **Elevator Framing:** The setting or erection of guides, cars, machinery, cables, sheaves, pans, etc., for elevators, is not to be required of the steel erector.

(l) **Field Assembling:** The size of assembled pieces of structural steel is fixed by the permissible weight and clearance dimensions of transportation. Unless such conditions are provided for by the Buyer or his engineer, the Seller shall provide for such field connections as will require the least field work; and such field connections shall be a part of the erection work.

(m) **Cutting and Patching:** The Seller shall not be required to cut or patch any work, except his own, unless particularly specified, and will not alter his own work required by changes or inaccuracies in the building without being reimbursed for the expense of such changes.

(n) **Insurance:** The erector shall indemnify and save harmless the Buyer from all claims and costs arising from any damage to person or property occurring in the performance of his own work due to any act or neglect of his employees or agents.

(o) **Temporary Floors:** The Buyer shall provide plank, and cover all floors required by municipal or state laws, excepting the floor upon which the erecting derricks are located. This floor will be provided by the steel erector for working purposes.

(p) **Field Paint:** Unless specifically agreed to in the contract, field paint shall be considered a phase of maintenance, and such protection as is necessary shall be provided for by the Buyer.

Section 8. Delays in Prosecution of Work.

(a) **Causes Not Controlled by Seller nor Buyer:** Neither Seller nor Buyer shall be responsible for delays in performance caused by delays at rolling mills, or in transportation, or due to strikes, fires, floods, storms, or any other circumstances beyond their reasonable control, whether related or unrelated, or similar or dissimilar to any of the foregoing. In case of delay to work due to any of the above causes, a reasonable extension of time shall be given for the completion of the work.

(b) **Delays Caused by the Seller:** Should the Seller at any time, except as provided in the preceding paragraphs, refuse or neglect to supply enough workmen of proper skill or material of proper quality, or to carry on the work with promptness and diligence, the Buyer, if not at fault, may give the Seller ten days' written notice, and at the end of that time if the Seller continues to neglect the work, the Buyer may provide such labor or materials and deduct the cost from any money due or to become due the Seller under the contract, or may terminate the employ-

J. S. HEATH CO.

WAUKEGAN, ILL.

FOUNDERS *and* MANUFACTURERS of ARCHITECTURAL

BRONZE

for

BANKS - BUILDINGS - MAUSOLEUMS
and MEMORIALS



Entrance Doors, Oak Grove Mausoleum,
St. Louis, Missouri.

CATALOGUE IN SWEETS.

ment of the Seller under this agreement and take possession of the premises and of all materials, tools, and appliances thereon and employ any other person to finish the work. In the latter case, the Seller shall receive no further payment until the work be finished; then if the unpaid balance that would be due under the contract exceeds the cost to the Buyer of finishing the work, such excess shall be paid to the Seller but if such cost exceeds such unpaid balance, the Seller shall pay the excess to the Buyer.

(c) **Delays Caused by the Buyer:** The Buyer shall be responsible for delays resulting from lack of complete data and from changes or revisions or the tardy approval of drawings. Information given later than the date fixed in the contract for the delivery of complete information shall not be cause for a claim by the Seller unless such delay affects Seller's costs or manufacturing operations. When such delays increase costs or compel changes in the Seller's manufacturing operations he shall be recompensed for the damage resulting.

If information is available for the Seller to manufacture or erect the material in accordance with the conditions of the contract and if he is prevented from the orderly and continuous prosecution of such work by any act or a neglect of the Buyer, the Seller may continue his work and may place fabricated material in storage at his own plant or elsewhere and the Buyer shall, upon tender of transfer of title, pay for said material as if it had been delivered under the terms of the contract. The Buyer shall also recompense the Seller for all expense incurred in the storing, caring for, or rehandling of said material; and for damage resulting from changed manufacturing operations. On erection work the Seller shall be recompensed for any extra expense incurred in wages and in the transportation of men or equipment to and from the site and their maintenance at the site during the period of delay, also for extra expense resulting from overtime made necessary by such delay.

If for more than one month at any time, any act or neglect of the Buyer or any legal proceeding taken against him, prevents the starting or continuous prosecution of the work, the Seller may give the Buyer ten days' written notice, and at the end of that time, if the Buyer continues at fault or the legal proceeding continues effective, the Seller may terminate his obligations under the contract: in which case the Buyer shall at once pay the Seller for the work done and material provided, and all damages the Seller may sustain, including damages resulting from changed shop operations.

Section 9. Extra Work.

(a) **General:** Charges for extra work, or work not covered by the contract, shall be made on a basis that is definitely and mutually understood between the Buyer and the Seller at the time the occasion for such extra expense arises.

In the absence of such an understanding between the Buyer and the Seller, the following is listed as proper expenses.

(b) **Material:** All extra material required shall be invoiced out at current warehouse prices, plus cost of fabrication, including regular overhead costs, plus transportation costs, and an agreed percent for profit.

(c) **Drafting Labor:** All extra labor in the drafting room shall be invoiced out at cost, plus overhead, plus an agreed percent for profit.

(d) **Shop Work:** All extra shop labor shall be charged at actual cost as shown by the time cards; to this shall be added the overhead expense, and the use of equipment and power. The sum of these charges shall be considered the actual cost of the shop, to which shall be added an agreed percent for profit.

(e) **Field Work:** All extra labor required in the erection of structural steel shall be invoiced as follows:

The actual labor cost shall be that shown by the time cards, to which shall be added the actual cost of insurance, the cost of labor transportation when necessary, and an additional allowance for overhead expense. The sum of these shall be considered the actual cost, to which shall be added an agreed percent for profit.

Should the Buyer or his agent or other trades engaged in the erection of other work connected with the structure require the use of materials or equipment belonging to the Seller, the Seller shall receive compensation for such extra service together with depreciation of equipment and an agreed percent for profit.

(f) **Miscellaneous:** Any additional cost, such as hauling, painting, crating, freight, etc., shall be charged at actual cost, plus overhead, plus insurance, plus an agreed percent for profit.

(g) **Overtime:** On contract work where the Seller has not agreed to work overtime, he shall not be required to do so without being paid for his extra expense and a profit.

(h) **Extra Cleaning:** If because of continued storage, or for any other reason not the fault of the Seller, it should be necessary to clean and repaint the steel work, the cost of this additional cleaning and painting should be paid for as an extra, including regular overhead charges as specified for extra work elsewhere in this section.

Section 10. Proposals and Contracts.

(a) **Direct Contracts:** It is recommended that in all cases where the structural steel frame of a building is self supporting, and also in all such other cases where the structural steel and iron items entering into the construction of a building can easily be separated from the other materials of construction, that all contracts for such structural steel or iron be made separately by the owner or his representative with the steel contractor.

(b) **Conflicts:** In the event of a conflict between the terms and conditions of the proposal, and the terms and conditions stated in the plans and specifications, the terms of the proposal shall govern.

(c) **Price for Additions or Deductions:** The Seller is not to be required nor expected to make the same unit price for additions to as for deductions from the list of material required for a structure. The contract may, however, specify a certain other unit price for such materials as may be deducted from the quantity of material as originally contemplated by the contract.

(d) **Material not Shown or Called for:** Clauses in the specification to the effect that all iron and steel items necessary to complete the structure shall be furnished by the Seller, whether or not they are shown on the plans or called for in the specifications, being obviously unfair, will not be recognized or subscribed to. The Seller shall, however,



Pearse Residence, Indian Hill, Ill.

Pucky & Jenkins, Architects

L. S. Ingeman
Ornamental Iron Co.
Ornamental Iron and Bronze



157 - 61 WENDELL STREET
CHICAGO

Telephone LINcoln 3350

furnish all material and labor for details that may be required for such steel and iron work as is shown on the drawings or called for in the specification, although such details may themselves not be shown or called for.

(e) **Items not to be Furnished:** Unless specifically mentioned in the request for bids, or specifically agreed to, the bidders do not estimate or include the following items in their proposals:

Any charges for surety bonds or insurance not required by law, or any other general charge such as building permits, license fees or taxes for permission to work in city or state, engineering fees, removal of rubbish, patching or repairing of plaster or masonry work, office or telephone service, light heat, fire insurance, or the erection of temporary structures, enclosures, or stairs.

(f) **Terms:** The following terms of payment are adopted as standard and will govern in all cases, except when otherwise agreed to in the contract.

1. All payments shall be made in funds current at par in the city in which the Seller furnishing the material is located.

2. All materials for export, net cash in exchange for shipping documents will be required.

3. For all materials to be erected by the Seller the Buyer shall on the 10th day of each month pay an amount equal to not less than 90% of the contract value of all ma-

terials shipped, stored or ready for shipment; and not less than 90% of the contract value of the erection performed during the preceding month; and shall pay the remainder within 10 days after the completion of the steel contract; but the amount reserved by the Buyer shall at no time exceed double the contract value of the work remaining yet to be done.

4. When the material which is not to be erected by the Seller is sold to a Buyer whose credit has been established with the Seller, terms net cash for contract value of each shipment. Payments to be made on the 10th day of the month following shipments.

5. Unless otherwise agreed to when material is sold delivered at, or freight allowed to destination, the Buyer shall pay freight charges and the Seller shall accept receipted freight bills as cash to apply on matured payments due on or after arrival at destination of materials covered by such freight expense bills.

6. Payments shall all be considered to be due and shall be paid at the time specified, regardless of the final settlement for the building as a whole, or for the work of any other trade; and when the contract is with a general contractor the payment for steel shall not be delayed by such general contractor pending his receiving estimates of payments from the owner.

7. Amounts past due shall bear interest at the maximum lawful rate.

GENERAL BRONZE CORPORATION

DISTINCTIVE METAL WORK

OF ALL KINDS

Eastern Division
LONG ISLAND CITY
NEW YORK

Western Division
BUILDERS BUILDING
CHICAGO



*The accompanying list of representative installations made during the
past year merits consideration:*

New York Central Office Building, New York	Rand Tower Minneapolis
Fidelity Philadelphia Trust.....	Chicago Daily News..... Chicago
..... Philadelphia	Civic Opera House..... Chicago
Municipal Building Philadelphia	Medinah Athletic Club..... Chicago
Bamberger Store Newark	Palm Olive Building..... Chicago
Keith Memorial Theatre..... Boston	Insurance Exchange Chicago
Koppers Building Pittsburgh	Pittsfield Building Chicago
Kaufman Store Pittsburgh	Foreman National Bank..... Chicago
Convention Hall..... Atlantic City	Merchandise Mart Chicago
Terminal Tower Cleveland	Passavant Memorial Hospital..... Chicago
Medical Arts & Builders Exchange..	Chicago Motor Club..... Chicago
..... Cleveland	Shedd Aquarium Chicago
First National Bank..... Detroit	R. R. Donnelley Building..... Chicago
Fox Theatre Detroit	McGraw-Hill Building Chicago
Fox Theatre St. Louis	Chicago Club Chicago
American Bank..... New Orleans	Steuben Club Chicago
Dade County Court House.... Florida	124th Field Artillery Armory..... Chicago
Foshay Tower Minneapolis	Studebaker-Pierce Arrow Show Rooms Chicago
North Western National Bank.....	Marshall Field Store..... Oak Park
..... Minneapolis	Marshall Field Store..... Evanston

STANDARD SPECIFICATIONS FOR CONCRETE FLOORS

That preference for concrete as a building material is on the increase is evident even to the casual observer as well as to the architects and engineers. Millions of square feet of concrete floors are in use and such floors will be found in all types of buildings. The importance, therefore, of using the latest and best methods in constructing concrete floors is obvious.

Best practice in the use of any material in construction for which it is adapted is necessary for best results. Concrete floors are no exception to this rule and the reason why some floors are hard, firm and resistant to abrasion while others constructed of suitable materials by contractors of intelligence and integrity are not satisfactory, is found in the methods and practices of manipulating the materials and curing the finished floor.

Concrete is essentially a modern construction material and it is only natural and inevitable that earlier methods would be susceptible to improvement. Large areas of concrete floors have been laid with only the observation and experience of engineers as a guide as to how to obtain the greatest strength and most desired qualities in the finished product. It is noteworthy that in many instances, in spite of lack of the guidance of laboratory investigations, individuals did learn by experience how to make concrete of very excellent quality. But searching scientific investigation for the purpose of revealing the fundamental principles of manipulating concrete materials to produce best results was doubtless delayed by the degree of excellency obtained in many of the floors constructed with only experience and observation as a guide.

The Structural Materials Research Laboratory at Lewis Institute has devoted much time to wear tests of concrete and through the results of thousands of tests has arrived at definite conclusions about how to proceed to produce concrete to resist wear.

In addition to these extensive laboratory investigations committees of engineering societies and organizations have been at work formulating specifications to serve as a guide to field practice. The American Concrete Institute has had for years a committee on concrete floor which has from year to year submitted suggested specifications for concrete floors. These suggested specifications have finally been adopted as a standard and are given below.

Special emphasis should be given in applying the specifications regarding the amount of water to be used in mixing concrete, to the methods of finishing—that is, troweling—and to curing the finished floor. Neglect of these factors or ignorance of their importance is responsible for a vast majority of such floors as have not proven satisfactory. Dusting may result from too fine, dirty or otherwise unsuitable sand, too little cement in the mixture, too much troweling, the use of driers and finally permitting the concrete to dry out too rapidly after placing.

GENERAL REQUIREMENTS MATERIALS

1. Cement: The cement shall meet the requirement of the current Standard Specifications for Portland Cement adopted by the American Society for Testing Materials.

2. Aggregates: Before delivery on the job, the contractor shall submit to the architect or engineer a fifty (50) pound sample of each of the aggregates proposed for use. These samples shall be tested, and if found to pass the requirements of the specifications, similar material shall be considered as acceptable for the work. In no case shall

aggregates containing frost or lumps of frozen material be used.

(a) Fine Aggregate: Fine aggregate shall consist of natural sand or screenings from hard, tough, crushed rock or gravel, consisting of quartz grains or other hard material, clean and free from any surface film or coating and graded from fine to coarse, with the coarse particles predominating. Fine aggregate, when dry, shall pass a screen having four (4) meshes to the linear inch; not more than twenty-five (25) per cent shall pass a sieve having fifty (50) meshes per linear inch and not more than five (5) per cent shall pass a sieve having one hundred (100) meshes per linear inch. Fine aggregate shall not contain injurious vegetable or other organic matter as determined by the colorimetric test not more than five (5) per cent by volume of clay or loam. Field tests may be made by the architect or engineer on fine aggregate as delivered at any time during progress of the work. If there is more than seven (7) per cent of clay or silt by volume in one (1) hour's settlement after shaking in one hundred (100) per cent excess of water, the material represented by the sample shall be rejected.

Briefly the colorimetric test may be applied in the field as follows: Fill a twelve (12) ounce graduated prescription bottle to the four and one-half (4½) ounce mark with the sand to be tested. Add a three (3) per cent solution of sodium hydroxide until the volume of sand and solution, after shaking amounts to seven (7) ounces. Shake thoroughly and let stand for twenty-four (24) hours. The sample shall then show a practically colorless solution or at most a solution not darker than straw color.

Fine aggregate shall be of such quality that mortar composed of one (1) part Portland Cement and three (3) parts fine aggregate, by weight, when made into briquets, shall show a tensile strength at seven (7) and twenty-eight (28) days at least equal to the strength of briquets composed of one (1) part of the same cement and three (3) parts standard Ottawa sand, by weight. The percentage of water used in making the briquets of cement and fine aggregate shall be such as to produce a mortar of the same consistency as that of the Ottawa sand briquets of standard consistency. In other respects all briquets shall be made in accordance with the methods of testing cement recommended by the American Society for Testing Materials. (See Cement Specifications, A. S. T. M.)

(b) Coarse Aggregate: Coarse aggregate shall consist of clean, hard, tough, crushed rock or pebbles graded in size, free from vegetable or other organic matter, and shall contain no soft, flat or elongated particles. The size of the coarse aggregate shall range from one and one-half (1½) inches down, not more than five (5) per cent passing a screen having four (4) meshes per linear inch, and no intermediate sizes shall be removed.

(c) No. 1 Aggregate for Wearing Course: No. 1 Aggregate for the wearing course shall consist of clean, hard, tough, crushed rock or pebbles, free from vegetable or other organic matter, and shall contain no soft, flat or elongated particles. It shall pass when dry a screen having three-eighths (¾) inch openings and not more than ten (10) per cent shall pass a screen having four (4) meshes per linear inch.

3. Mixed Aggregate: Crushed run stone, bank-run gravel or mixture of fine and coarse aggregate prepared before delivery on the work shall not be used.

4. Subbase: Only clean, hard material, such as coarse gravel or steam-boiler cinders, free from ash or particles of unburned coal,

FRIEDLEY-VOSHARDT COMPANY

Founded 1888

*Designers and Manufacturers of
Art Metal Work*

733 - 37 South Halsted Street

CHICAGO, ILL.



PRODUCTS

Stamped sheet bronze, brass, copper, lead and zinc—including statuary, ornaments for cornices, finials, billboards — mar- quises.

Metal Ceiling and Side Walls.

Copper Lanterns.

Also the F. V. Co. Interchangeable Day and Night letter for theater canopies. Made of Cast Aluminum or Stamped Zinc.

SPECIAL WORK

Inquiries and plans are solicited from architects and estimates, either on special work from their details or stock designs will be given.

OUR CATALOG WILL BE SENT ON REQUEST

shall be used in the subbase. (Note: Eliminate this clause when subbase is not required.)

5. Water: Water shall be clean, free from oil, acid alkali or vegetable matter.

6. Color: If artificial coloring matter is required, only those mineral colors shall be used which, in the amount hereinafter specified, will not appreciably impair the strength of the resulting concrete nor fade under the action of the elements and washing compounds.

7. Reinforcement: The reinforcing metal shall meet the requirements of the current Standard Specifications for Steel Reinforcement of the American Society for Testing Materials. It shall be free from excessive rust, scale, paint or coatings of any character which will tend to reduce or destroy the bond.

8. Joint Filler: The joint filler shall be a suitable compound that will not become soft and run out in hot weather, nor hard and brittle and chip out in cold weather; or, prepared strips of fibre matrix and bitumen as approved by the architect or engineer. The strips shall be at least $\frac{1}{4}$ in. in thickness and not over $\frac{1}{2}$ in. except as directed by the engineer or architect.

MEASURING AND MIXING

9. Measuring: The method of measuring the materials for the concrete or mortar, including water, shall be one which will insure separate and uniform proportions of each of the materials at all times. A sack of Portland Cement (94 pounds net) shall be considered as one (1) cubic foot.

10. Machine Mixing: All concrete shall be mixed by machine except when the architect or engineer shall otherwise permit under special conditions. A batch mixer of an approved type shall be used. The ingredients of the concrete or mortar shall be mixed to the specified consistency, and the mixing shall continue for at least one (1) minute after all the materials are in the drum. Raw materials shall not be permitted to enter the drum until all the material of the preceding batch has been discharged.

11. Hand Mixing: When it is necessary to mix by hand, the materials shall be mixed dry on a watertight platform until the mixture is of uniform color, the required amount of water added, and the mixing continued until the mass is of uniform consistency and homogeneous.

12. Retempering: Retempering of mortar or concrete which has partially hardened, that is, mixing with or without additional materials or water, shall not be permitted.

PROTECTION

13. Treatment: As soon as the finished floor has hardened sufficiently to prevent damage thereby, the floor shall be covered with at least one (1) inch of wet sand or two (2) inches of sawdust which shall be kept wet by sprinkling with water for at least ten (10) days. Where sawdust is used for curing only varieties of wood which will not stain the concrete shall be used.

14. Protection: The freshly-finished floor shall be protected from hot sun and drying winds until it can be sprinkled and covered as above specified. The concrete surface must not be damaged or pitted by raindrops, and the contractor shall provide and use when necessary sufficient tarpaulins to completely cover all sections that have been placed within the preceding twelve (12) hours.

15. Temperature Below 35 Degrees Fahrenheit: If at any time during the progress of the work the temperature is, or in the opinion of the architect or engineer will within twenty-four (24) hours drop to, 35 degrees Fahrenheit, the water and aggregates shall be heated and precautions taken to protect the work from freezing for at least five (5) days.

REINFORCED CONCRETE FLOORS

For reinforced concrete floors the following will apply in addition to the general requirements.

16. Forms: The forms shall be substantial, unyielding and so constructed that the concrete will conform to the designed dimensions and contours, and shall also be tight to prevent the leakage of mortar. The supports for floors shall not be removed in less than ten (10) days after the concrete is placed, and then only with the consent of the architect or engineer in charge. When freezing weather occurs, the supports shall remain in place an additional time, equal to the time the floor has been exposed to freezing.

17. Reinforcement: Reinforcing metal shall be provided as called for on the plans. It shall be placed as indicated and mechanically held in position so that it will not become disarranged during the depositing of the concrete. Whenever it is necessary to splice tension reinforcement, the character of the splice shall be such as will develop its full strength. Splices at points of maximum stress shall be avoided. Splicing by lapping bars without contact and with space between bars along the over-lap equal to twice the thickness of the bars is preferable to mechanical splices or clamps.

CONCRETE SLAB

18. Proportions: The concrete shall be mixed in the proportions by volume of one (1) sack of Portland Cement, two (2) cubic feet of fine aggregate and four (4) cubic feet of coarse aggregate.

19. Consistency: The materials shall be mixed wet enough to produce a concrete of a consistency that may be readily caused to flow into the forms and about the reinforcement, but which can be conveyed from the mixer to the forms without the separation of the coarse aggregate from the mortar.

20. Placing: The concrete shall be placed in a manner to insure a smooth ceiling, and thoroughly worked around the reinforcement and into the recesses of the forms. Concrete shall be deposited in its full position as soon as possible after mixing and within (30) minutes after the water has been added to the dry materials. It shall be struck off to a surface at least one (1) inch below the established grade of the finished surface of the floor. Workmen shall not be permitted to walk in freshly laid concrete, and if sand or dust collects on the base, it shall be carefully removed before the wearing course is applied.

21. Joints: When it is necessary to make a joint in a floor slab, its location shall be designated by the architect or engineer; joints to be vertical.

WEARING COURSE

22. Proportions and Thickness (Mixture No. 1): The mortar shall be mixed in the proportions of one (1) sack of Portland Cement and two (2) cubic feet of fine aggregate. The minimum thickness shall be three-quarters ($\frac{3}{4}$) inch.

23. Proportions and Thickness (Mixture No. 2): The mortar shall be mixed in the proportions of one (1) sack of Portland Cement, one (1) cubic foot of fine aggregate and one (1) cubic foot of No. 1 aggregate for wearing course. The minimum thickness shall be one (1) inch.

24. Consistency: The mortar shall be of the dryest consistency possible to work with a sawing motion of the strikeboard.

25. Placing: The wearing course shall be placed immediately after mixing. It shall be deposited on the fresh concrete of the base before the latter has appreciably hardened, and brought to the established grade with a strikeboard.

NOTE: When placing the wearing course after the concrete slab has hardened, eliminate paragraph 25 and substitute the following:

26. Preparation of Slab: The surface of the slab shall be thoroughly roughened by picking, and swept clean of all dirt and debris.

27. Placing: The slab shall be thoroughly moist but free from pools of water when the grout and mortar for wearing course is placed. A neat cement grout shall be brushed on the surface of the slab, the wearing course immediately applied and brought to the established grade with a strikeboard. Grout and mortar shall be used within forty-five (45) minutes after mixing with water.

28. Finishing: After the wearing course has been brought to the established grade by means of a strikeboard, it shall be worked with a wood float in a manner which will thoroughly compact it and provide a surface free from depressions or irregularities of any kind. When required, the surface shall be steel-troweled, but excessive working shall be avoided. In no case shall dry cement or a mixture of dry cement and sand be sprinkled on the surface to absorb moisture or to hasten the hardening, but the Bruner method may be used if desired.

29. Coloring: If artificial coloring is used, it must be incorporated with the entire wearing course and shall be mixed dry with the cement and aggregate until the mixture is of uniform color. In no case shall the amount of coloring exceed five (5) per cent of the weight of the cement.

PLAIN CONCRETE FLOORS

For plain concrete floors the following will apply in addition to the general requirements:

SUBGRADE

30. Preparation: All soft and spongy places shall be removed and all depressions filled with suitable material which shall be thoroughly compacted in layers not exceeding six (6) inches in thickness. The subgrade shall be thoroughly tamped until it is brought to a firm, unyielding surface.

31. Deep Fills: All fills shall be made in a manner satisfactory to the architect or engineer. The use of muck, quicksand, soft clay, spongy or perishable material is prohibited.

32. Drainage: When required, a suitable drainage system shall be installed and connected with sewers or other drains indicated by the engineer.

33. Depth: The subgrade shall be not less than (00) inches below the finished surface of the floor.

NOTE: Subgrade is to be five (5) inches below the finished surface of the floor when subbase is not required, and at least eleven (11) inches below when subbase is required.

SUBBASE

(Omit these sections when subbase is not required.)

34. Thickness: On the subgrade shall be spread a material as hereinbefore specified, which shall be thoroughly rolled or tamped to a surface at least (00) inches below the finished grade of the floor. On fills, the subbase shall extend the full width of the fill.

35. Wetting: While compacting the subbase, the material shall be kept thoroughly wet, and shall be in that condition when the concrete is deposited.

FORMS

36. Materials: Forms shall be free from warp and of sufficient strength to resist springing out of shape.

37. Setting: The forms shall be well staked or otherwise held to the established

lines and grades and their upper edges shall conform to the established grade of the floor.

38. Treatment: All wood forms shall be thoroughly wetted and metal forms oiled or coated with soft soap or whitewash before depositing any material against them. All mortar and dirt shall be removed from forms that have been previously used.

CONSTRUCTION

39. Size of Slabs: The slabs or independently-divided blocks when not reinforced shall have an area of not more than one hundred (100) square feet, and shall not have dimensions greater than ten (10) feet. Larger slabs shall be reinforced as herein-after specified.

40. Thickness of Floor: The thickness of the floor shall be not less than five (5) inches.

41. Width and Location of Joints. When required by the architect or engineer in charge, a one-half ($\frac{1}{2}$) inch space or joint shall be left between the floor and the walls and columns of the building, to be filled with the material before specified under "Joint Filler."

42. Protection of Edges: Where required by the architect or engineer in charge, the edges of the slabs at the joints shall be protected by metal. Unless protected by metal, the upper edges of the slabs shall be rounded to a radius of one-half ($\frac{1}{2}$) inch.

TWO-COURSE FLOOR

Concrete Base.

43. Proportions: The concrete shall be mixed in the proportions by volume of one (1) sack of Portland Cement, two and one-half ($2\frac{1}{2}$) cubic feet of fine aggregate and five (5) cubic feet of coarse aggregate.

44. Consistency: The materials shall be mixed wet enough to produce a concrete of a consistency that will flush readily under slight tamping, but which can be handled without causing a separation of the coarse aggregate from the mortar.

45. Placing: After mixing, the concrete shall be handled rapidly and the successive batches deposited in a continuous operation completing individual sections to the required depth and width. Under no circumstances shall concrete that has partly hardened be used. The forms shall be filled and the concrete struck off and tamped to a surface the thickness of the wearing course below the established elevation of the floor. The method of placing the various sections shall be such as to produce a straight, clean-cut joint between them so as to make each section an independent unit. If dirt, sand or dust collects on the base it shall be removed before the wearing course is applied. Workmen shall not be permitted to walk on the freshly laid concrete. Any concrete in excess of that needed to complete a section at the stopping of work shall not be used. In no case shall concrete be deposited upon a frozen subgrade or subbase.

46. Reinforcing: Slabs having an area of more than one hundred (100) square feet, or having dimensions greater than ten (10) feet, shall be reinforced with wire fabric, or with plain or deformed bars. The reinforcement shall have a weight of not less than twenty-eight (28) pounds per one hundred (100) square feet. The reinforcement shall be placed upon and slightly pressed into the concrete base immediately after the base is placed. It shall not cross joints and shall be lapped sufficiently to develop the full strength of the metal.

WEARING COURSE

47. Proportions for Mixture No. 1: The wearing course shall be mixed in the proportions of one (1) sack of Portland Cement, two (2) cubic feet of fine aggregate. The minimum thickness shall be three-quarters ($\frac{3}{4}$) inch.

48. Proportions for Mixture No. 2: The wearing course shall be mixed in the proportions of one (1) sack of Portland Cement and one (1) cubic foot of fine aggregate, and one (1) cubic foot of No. 1 aggregate for wearing course. The minimum thickness shall be one (1) inch.

49. Consistency: The mortar shall be of the dryest consistency possible to work with a sawing motion of the strikeboard.

50. Placing: The wearing course shall be placed immediately after mixing. It shall be deposited on the fresh concrete of the base before the latter has appreciably hardened, and brought to the established grade with a strike-board. In no case shall more than forty-five (45) minutes elapse between the time the concrete for the base is mixed and the wearing course is placed.

51. Finishing: After the wearing course has been brought to the established grade by means of a strikeboard, it shall be worked with a wood float in a manner which will thoroughly compact it and provide a surface free from depressions or irregularities of any kind. When required, the surface shall be steel-troweled, but excessive working shall be avoided. In no case shall dry cement or a mixture of dry cement and sand be sprinkled on the surface to absorb moisture or to hasten the hardening, but the Bruner method may be used if desired. Unless protected by metal the surface edges of all slabs shall be rounded to a radius of one-half (½) inch.

52. Coloring: If artificial coloring is used, it must be incorporated with the entire wearing course, and shall be mixed dry with the cement and aggregate until the mixture is of a uniform color. In no case shall the amount of coloring exceed ten per cent of the weight of the cement except where such a percentage will prove injurious to the resulting concrete, in which case the amount of coloring shall be limited to five per cent of the weight of the cement.

ONE-COURSE FLOOR

53. Proportions: The concrete shall be mixed in the proportions of one (1) sack of Portland Cement to not more than two (2) cubic feet of fine aggregate and not more than three (3) cubic feet of coarse aggregate, and in no case shall the volume of the fine

aggregate be less than one-half (½) the volume of the coarse aggregate.

A cubic yard of concrete in place shall contain not less than six and eight-tenths (6.8) cubic feet of cement.

54. Consistency: The materials shall be mixed with sufficient water to produce a concrete which will hold its shape when struck off with a strikeboard. The consistency shall not be such as to cause a separation of the mortar from the coarse aggregate in handling.

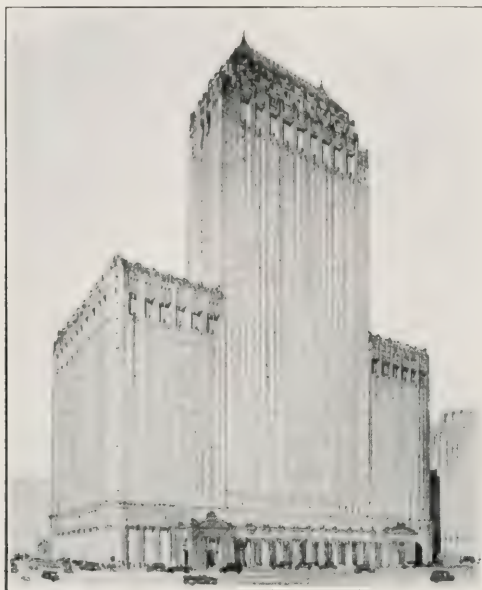
55. Placing: After mixing, the concrete shall be handled rapidly and the successive batches deposited in a continuous operation completing individual sections to the required depth and width. Under no circumstances shall concrete that has partly hardened be used. The forms shall be filled and the concrete brought to the established grade with a strike-board. The method of placing the various sections shall be such as to produce a straight, clean-cut joint between them so as to make each section an independent unit. Any concrete in excess of that needed to complete a section at the stopping of work shall not be used. Workmen shall not be permitted to walk on the freshly-laid concrete. In no case shall concrete be deposited upon a frozen subgrade or subbase.

56. Reinforcing: Slabs having an area of more than one hundred (100) square feet, or having any dimensions greater than ten (10) feet, shall be reinforced with wire fabric or with plain or deformed bars. The reinforcement shall have a weight of not less than twenty-eight (28) pounds per one hundred (100) square feet. The reinforcement shall be placed upon and slightly pressed into the concrete base immediately after the base is placed. It shall not cross joints and shall be lapped sufficiently to develop the full strength of the metal.

57. Finishing: After the concrete has been brought to the established grade by means of a strikeboard, and has hardened somewhat, but is still workable, it shall be floated with a wood float in a manner which will thoroughly compact it and provide an even surface. When required, the surface shall be steel-troweled, but excessive working shall be avoided. Unless protected by metal the surface edges of all slabs shall be rounded one-half (½) inch.

BUILDING CODE REQUIREMENTS FOR LIVE LOAD IN VARIOUS CITIES
In Pounds Per Square Foot

STRUCTURE	BALTIMORE	BOSTON	BUFFALO	CHICAGO	CINCINNATI	INDIANAPOLIS	MILWAUKEE	MINNEAPOLIS	NEW ORLEANS	NEW YORK	PHILADELPHIA	PITTSBURGH	ST. LOUIS	SAN FRANCISCO	SEATTLE	WASHINGTON
Apartments	60	50	50	40	40	50	30	50	40	40	40	70	50	60	40	40
Assembly Halls	125	100	100	100	100	125	80	125	125	100	100	150	100	125	100	100
Dwellings	60	50	40	40	40	50	30	50	40	40	40	70	50	60	40	40
Hospitals	75	50	70	50	40	50	30	50	70	40	40	70	50	40	40	40
Hotels	60	50	70	50	40	75	30	50	70	40	40	70	50	60	40	40
Heavy Manufacturing	175	250	120	100	150	200	100	...	200	120	120	125	...	250	125	150
Light Manufacturing	125	125	120	100	100	100	100	100	125	120	120	125	100	125	...	150
Heavy Warehouse	250	250	150	100	150	200	100	...	200	120	120	200	150	250	...	250
Offices	75	75	50	50	50	75	40	75	70	60	60	70	60	40	50	70
Schools—Class Rooms	50	50	50	40	60	100	40	75	60	75	75	70	75	75	50	40
Roofs—Slope less than 20°	30	40	40	25	25	30	30	50	30	40	30	50	30	30	40	30



Civic Opera House, Chicago
Graham, Anderson, Probst & White, Architects

National Fire Proofing Company

BUILDERS BUILDING, CHICAGO, ILL.

Phone Franklin 5754

MANUFACTURERS OF

Terra Cotta Hollow Tile

for Building Purposes

*Contractors for construction of Hollow Tile Fireproof
Buildings, also Reinforced Concrete Buildings*

HOLLOW CLAY BUILDING TILE SPECIFICATIONS

Application and Installation

1. Work and Materials required to be furnished under this division of the specifications comprehends and includes everything in the way of material, transportation and labor required for furnishing and erecting in place in the building complete ready for use of all structural "Hollow Burned Clay Building Tile" of every sort including all mortar, scaffolding, forms, centers, hauling, hoisting, placement and cleaning up after completion, for clay tile foundations, walls including party division and fire, partitions, furring, fireproofing, floor and roof construction, combination hollow clay tile and concrete floor construction, etc., placed under "General Conditions of the Contract" as defined in documents known as the "Illinois Building Contract Documents" and special general conditions enumerated as follows:

A. Skilled Masons, Mechanics and Laborers, as required for the proper execution of same shall be employed on this construction work who shall be fully and carefully supervised by responsible, competent authority.

B. Apparatus including hoisting devices, machinery, tools, equipment, forms, centering, necessary to carry on this work shall be furnished so as not to unnecessarily delay the progress of the building or other contractors and without retarding the rate of progress stipulated in the contract.

C. Drawings shall be furnished as necessary to accurately locate setting and detail adaptation to structural shapes consisting of large scale details or full sized drawings for all special shapes required, including column coverings, girder covers, lintel covers and general type of arch. Drawings shall be submitted to the architect for approval before tile is burned.

2. Common Physical Characteristics of hollow burned clay building tile shall be those established by the American Society for Testing Materials and the Bureau of Standards of the U. S. Government. According to physical tests, tile shall be classified on the basis of strength and absorption requirements both of which shall be met for a given class in strict accord with the enumeration which follows:

D. Dry Weight for tiles of various sizes and cell numbers shall not vary more than 5% from the enumeration which follows:

Size of Unit in.	Number and of Weight	
	Cells	Lb.
3 3/4 by 12 by 12	3	29
6 by 12 by 12	6	30
8 by 12 by 12	6	33
10 by 12 by 12	6	42
12 by 12 by 12	6	48
12 by 12 by 12	9	52
3 3/4 by 5 by 12	1	9
8 by 5 by 12	2	16
8 by 5 by 12	3	16
8 by 5 by 12 ("L" Shaped)	1	16
8 by 6 3/4 by 12 ("T" Shaped)	4	16
8 by 7 3/4 by 12 (Square)	6	24
8 by 10 3/4 by 12 ("H" Shaped)	7	32
8 by 8 by 8 (Cube)	9	18

E. Dimensions in any particular shall not vary more than 3% for any form of tile.

F. Weather Resistance of Tile for exterior work shall be such that it will be able to withstand 100 alternate freezings and thawings. Tile classed as "hard" or "medium" by these specifications may be classified as meeting weathering requirements provided they are burned to the normal maturity for the given clay. Tile classed as "soft" shall be classified according to results of freezing tests.

G. Fire Resistance rating shall be in strict accord with the Bureau of Standards requirements, serial 617-BS and the standards established by special report of Underwriter's Laboratories. Special shapes where asking for ratings higher than indicated on this report shall carry certificate of the manufacturer guaranteeing such higher ratings.

3. Clay for Manufacture of Hollow Clay Tile shall be fire clay, shale or admixtures of same. These clays may be used in any kind of hollow clay tile. Surface clay of approved quality may be used only for the manufacture of interior non-load bearing tile, floors, girder and column covers, and for fireproofing. Exposed or exterior wall tile facing or veneering regardless of kind, shall be of low absorption

A. HOLLOW BURNED-CLAY LOAD-BEARING BUILDING TILE

Class	Absorption, per cent		Compressive Strength, Based on Gross Area, lb. per sq. in.			
			End Construction		Side Construction	
	Mean of 5 tests	Individual Maximum	Mean of 5 tests	Individual Minimum	Mean of 5 tests	Individual Minimum
Hard	12 or less	15	2000 or more	1400	1000 or more	700
Medium	16 or less	19	1400 or more	1000	700 or more	500
Soft	25 or less	28	1000 or more	700	500 or more	350

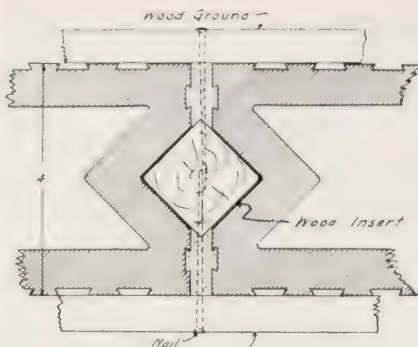
Color shall not be taken as indicative of classification as different types of clay produces different colors of the same relative hardness and density and different types of clay are used in the manufacture of tile of same physical qualities.

B. End Construction Tile when used on the side shall meet the requirements of that construction and vice versa.

C. Masonry Strength for Clay Tile Walls of varying thickness shall vary uniformly in proportion to wall area. Tile for different wall thicknesses shall be designed to meet this requirement.

tion ratios and manufactured of fire clay shale or admixtures of same.

4. Classification and Grade Marking of Clay Tile shall be legibly imprinted or indented in the exterior wall of each tile, together with the trade mark or name of the manufacturer so as to identify the character of the tile and its appropriate use. Manufacturers of tile shall guarantee the replacement of same without cost to users if the tile does not comply with the grade mark stamped on same by them. All tile used in construction shall conform to the standards established by the American Society for Testing Ma-



ILLINOIS FIRE PROOF CONSTRUCTION CO.

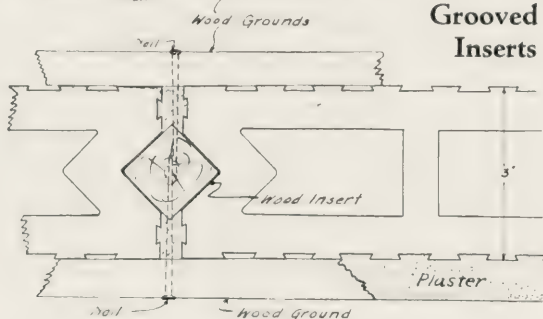
228 N. La Salle Street

State 4195

CHICAGO

Improved System of Nailing Wood Grounds

Grooved Tile Block with Wood
Inserts Supplies Nailing Base



The wood inserts are fireproofed with enclosures of tile and mortar. The wood grounds are attached by nailing thru the mortar joints.

A NEW GYPSUM TILE

LESS
BREAKAGE



STANDARD
SIZES

WILL NOT EFFLORESCE

MANUFACTURED IN ILLINOIS

Sold and Installed by

INTERSTATE FIREPROOFING CO.

844 Rush Street

CHICAGO

Superior 8015-6

terials. All tile shall be well burned, reasonably free from laminations, cracks, or other defects that would interfere with the proper setting of the tile or impair the strength or permanency of the construction, and shall be free from warpage or twist. Broken or imperfect tile shall not be used in construction.

5. Mortar for laying clay tile shall be mixed in mechanical mixers with quantities carefully measured as particularly specified and in quantities sufficient to insure the steady progress of the work. Hand mixing shall be permissible only when specially arranged for in strict accord with architect's specifications for mortars for this sort of work. Mortar containing Portland Cement shall not be re-tempered after it has taken its initial set. Proportions of ingredients, manner of placement, thickness of joints, etc., for various types of tile shall be in strict accord with the enumeration which follows:

A. Mortar for Load Bearing Walls shall be composed of one part Portland Cement to 1/6 part hydrated lime to three parts clean sharp sand. Such mortar shall not be re-tempered or used after it has taken its initial set.

B. Joints for Load Bearing Walls shall be so made as to develop full bearing for tile masonry and make the walls perfectly water and wind tight. Vertical joints shall be perfectly filled with wind and water tight both inside and outside for a distance of not less than 3/4" from the face, and left hollow between so as to form an air space. Structural fireproofing shall be filled solidly with mortar and aggregate avoiding the use of siliceous aggregates for filling.

C. Mortar for Non-Load Bearing Partitions, floor arches, and fireproofing shall be composed of one part by volume of Portland Cement to 1/3 part hydrated lime or lime putty to four parts clean sharp sand. If lime putty is used, same shall be made from freshly burned lime and thoroughly slaked.

D. Unfinished Exterior Walls shall be covered or protected from the elements and in no case shall clay tile wall construction be carried to a point higher than 6' in advance of the general level of masonry construction.

6. Foundation Walls from the top of footings to a point at least 12" above grade line shall be of hard burned clay tile low in absorption and set in a dense Portland Cement mortar. All walls shall be started upon solid concrete footings. The minimum thickness for foundation walls shall be 12".

A. Joists entering foundation walls shall rest upon tile bearing plates or solid masonry in lieu of same.

B. Joists in foundation walls shall be protected with closures and backing so as to prevent water entering walls.

C. Unglazed Tile where used for outside walls and basements shall be given an exterior coat of waterproof Portland Cement mortar or other approved dampproofing.

D. Glazed or Vitrified Tile Foundation Walls need not be waterproofed on the exterior but joints shall be carefully pointed perfectly water tight with Portland Cement mortar consisting of one part Portland Cement to two parts of clean sand.

E. Basement Floor Tile where used for paving basement floors shall be laid on a foundation or bed and set in manner as per following enumeration:

1st. **The Earth** underneath the floor shall be levelled off to a true even level free from hollows and tamped so as to make a compact level surface. Where the earth fill contains soft spots and over cesspools, vaults, and other excavations place a solid slab of

reinforced concrete material before applying cinder fill.

2nd. **Fill** on top of same with a 6" layer of bituminous cinders. Level off to a true even level and tamp or roll free from voids which might cause settlement.

3rd. **Tiles** shall be laid over same in true uniform manner with joints perfectly aligned and grouted with a Portland Cement grout consisting of one part Portland Cement to one part torpedo sand to 1 1/2 parts clean roofing gravel, well grouted into the joints and built up on surface to 1 1/4" in thickness above the tile and troweled off to a true even surface in strict accord with best cement finisher's practice. Tile for paving purposes shall be not less than 4" in thickness and of the kind known as "hard." It shall be dovetailed scored on the top surface so as to form a mechanical bond with cement top finish.

7. Exterior and Load Bearing Clay Tile Walls, where required to be constructed shall comply with standard specifications as to absorption, compressive strength area and weight for "Load-Bearing Building Tile" (C-34-24-T) and also shall meet special conditions as per enumeration which follows:

A. Placement shall be such as will develop the full strength of the tile when laid in the wall.

B. Exposed Surfaces of Walls either inside or outside shall be faced with tile of color and texture to match in spirit and intent the sample approved by the Architect.

C. Mortar Joints shall be of color, type and character as per samples laid up and approved by the Architect. It shall be the duty of the contractor to lay up different samples of tile for the Architect's approval.

D. Allowable Working Stress on hollow clay tile laid with the cells vertical shall in no case exceed 120 pounds and when laid with the cells horizontal 80 pounds, in each case per square inch gross horizontal cross sectional area of walls.

E. Allowable Thickness of walls shall in no case be less than the thickness prescribed by the law and good practice under similar placement for brick masonry.

F. Corners shall be carefully formed plumb on both sides with perfect tile free from defects, fully bedded in mortar and perfectly bonded to secure straight and true corners which will develop full strength.

G. Bonding of Face Brick Stone or Other Facing to hollow clay tile backing shall be with at least one row of full length headers in every seventh course of brick facing, or there shall be at least one full length header in every 90 square inches of wall surface area.

H. Facing Material Thickness shall be considered a part of the wall thickness but the maximum stress in such facing material shall not be assumed to exceed that allowable for tile backing (see Sec. 7-D).

I. Changes in Thickness of Walls where required to be made shall be so made as to transmit loads from vertical webs directly on top of webs below; where this is not practical or possible, tile slabs or solid brick masonry shall be introduced to distribute the load and not put strain on horizontal shells.

J. Concentrated Loads, wherever they occur on walls, shall be so distributed by means of spread metal bearing plates, beams or lintels or by brick concrete or other solid masonry as not to impose a unit stress on wall of more than that allowable for the type of tile used (see Sec. 7-D).

K. Excess Loads on Pilasters where more than proper allowable tile bearing load (see

Wm. E. Dee Company

Hollow Building and Partition Tile

Sewer Pipe Flue Lining
Wall Coping Drain Tile

FIRE BRICK AND CLAY, BUILDING MATERIAL, ETC.
MANHOLE AND CATCH BASIN COVERS, SANITARY CASTINGS

FACE BRICK

Main Office, 30 North La Salle Street, Chicago

TELEPHONE FRANKLIN 1523

WORKS

Mecca, Indiana - Cayuga, Indiana - Newport, Indiana
Oak Hill, Ohio - Montezuma, Ind.

Dearborn 6607

CONTINENTAL CHIMNEY CO.

INC.

**RADIAL BRICK, COMMON BRICK and
FACE BRICK CHIMNEYS**

Chimneys Repaired While In Operation

127 N. Dearborn Street

CHICAGO, ILL.

Sec. 7-D) shall be provided for by strengthening the plaster in the following manner:

1st. **Insert Metal Rods** in the four corners of the plaster of the size specified and if no size is mentioned, not less than $\frac{3}{8}$ ".

2nd. **Fill** all the cells of the plaster and the wall back of same with concrete composed of one part Portland Cement to two parts clean sharp sand to three parts of gravel or crushed stone which will pass a $\frac{3}{4}$ " mesh screen and be retained on a $\frac{1}{4}$ " mesh.

L. Joist Bearings wherever joists are required to rest on walls shall be not less than 4" and shall be composed of bearing slabs of tile not less than 1" in thickness or solid brick masonry placed for bearing purposes. The sides, top and back of all floor joists where they rest on walls shall be surrounded with solid tile construction, solid brick masonry or closed tile, so that combustible construction does not come in contact with any openings in wall.

M. Joist Anchors where required to be used shall be placed at the bottom of joists so that if the joists fall for any cause whatsoever, they can drop down without putting leverage strain on the wall.

N. Sills of Clay Tile shall be formed with special shapes designed for that purpose of "dense" grade tile. These shapes shall be of such a nature as to form a shoulder or interlock underneath window frames so as to dam off and prevent water from running underneath same and they shall also be so designed as to drip free from wall. Joints shall be filled with Portland Cement mortar and wood sub-sills or frames shall be set in a thick heavy bed of mastic or rock putty.

O. Lintels not exceeding 5' in clear span shall be formed with load bearing tile reinforced with rods through cells and filled solid with concrete same as specified for filling plaster (see Sec. 7-K). Such lintels shall be cast and allowed to season at least ten days before placing. They shall be reinforced in the top as well as in the bottom so as to facilitate placement without fracture. For size and amount of reinforcement see notes on drawings or in schedules or reinforcing.

P. Openings in clay tile walls shall have straight true tile jambs laid in workmanlike manner to provide a solid exterior surface using special shapes where required. When special shapes or jamb blocks are used, the installation shall be according to manufacturer's details and instructions. Wood Frames for such openings shall be carefully caulked around with oakum and mastic cement so as to make a perfectly water and wind tight bond between frames and walls. These frames will be designed with some form of wooden interlock or metal bond strip to form an interlocking bond between the wood and tile.

Q. Arch Openings shall be built to radius and camber as indicated by drawings using tile units small enough to attain proper curvature in order that the top of mortar joints may not be too heavy. Arch framing forms shall be placed which shall not be removed until work has thoroughly set up. The width of abutment must be sufficient to resist the thrust of arch and mortar used for arches shall be composed of Portland Cement and sand mixed in the proportions of one to three. Walls immediately above arches shall have one $\frac{3}{4}$ " bar laid horizontally in the joint of same for each 4" in thickness, requiring three bars for 12" wall and two bars for 8" wall.

R. Special Shapes where used to provide special bond features or for built in insulation shall be furnished and laid strictly in accord with manufacturer's directions.

S. Furring Tile wherever indicated on plans for exterior walls of building shall be 2" furring tile. These tile shall be anchored to the walls with metal ties built into the masonry every two courses in height and at intervals not greater than 36" in horizontal direction.

8. Interior Non-Load Bearing Clay Tile Walls where required to be constructed shall comply with standard specifications as to absorption, compressive strength area and weight for non-load bearing tile as prepared by the American Society for Testing Materials, Serial designation C-56-26T, with all amendments thereto to date, and shall also meet special conditions as per enumeration which follows:

A. Tile for Walls and Partitions shall be sound, uniform in shape, and free from imperfections which will impair its fire resisting quality, permanence, or durability for the purposes intended.

B. Support for non-load bearing tile partitions shall be arranged so that all partitions shall start on solid bearings and continue in straight and level courses; being firmly restrained at sides and top where same come in contact with other materials. In no sense shall non bearing clay tile partitions or walls carry any distributed and/or concentrated loading in excess of their own weight.

C. Nailing Strips shall be provided for the attachment of grounds at not to exceed 24" o.c. and so as to carry out the spirit and intent of Architect's detail drawings. Exception: if spot grounds, toggle bolts or clinch nails are specified or detailed, then nailing strips may be omitted.

9. Chases shall be built into load bearing walls using, if necessary, special shapes to be provided. Where the strength of walls will not be impaired, tile with vertical cells may be cut for the installation of vertical chases. Tile damaged in this process must be replaced satisfactorily before proceeding with other work. Under no circumstances shall tile walls or partitions be cut into for horizontal lines of pipe or conduit and any material so treated shall be replaced at the cost of the mechanic installing such pipe or conduit work to make a perfect complete and workmanlike job.

10. Decorative Wall Treatment for sanitary walls, special glazed tile, together with coves, special corners, caps or mouldings, shall be provided in accordance with architect's specifications. Texture surfaces, colors, kind, quality and manner of making mortar joints shall be in accordance with samples furnished and approved by the Architect.

11. Floor and Roof Arch Clay Tile Construction where required shall comply with standard specifications as to absorption, compressive strength, area, weight and design for floor and roof arch construction as prepared by the American Society for Testing Materials, serial designation C-57-26T with all amendments thereto to date, and shall also meet special conditions as per enumeration which follows:

A. Spans of hollow clay tile flat arch construction between steel floor or roof beams shall not exceed 8' 6". Span of segmental arch construction shall not exceed 12' except where specially designed in accordance with accepted engineering formula. The supporting beams for arch floor construction shall be tied together with steel tie rods.

B. Tie Rods in no case shall be less than $\frac{3}{4}$ " in diameter and spaced as required to resist the thrust of arch at not to exceed eight times the depth of the beam between tie rods or tie rod and girder. Tie rods shall be placed as near the point of thrust of the arch as practicable, and shall be completely incased within the construction to a depth

of at least two inches unless the tie rods are otherwise protected with fireproof covering below the soffit of arch.

C. Quality and Manufacture. Hollow clay tile for this form of construction shall be sound, hard, uniformly burned and shall be free from imperfections which would impair the structural properties, permanence, or fire-resistant quality of the construction, and shall have an (average) crushing strength of at least 2,000 lbs. per sq. inch of net sectional area when tested on end with the cells in alignment with the direction of pressure. The shells of hollow tile for arch construction shall not be less than $\frac{3}{8}$ " thick and the webs not less than $\frac{5}{8}$ " thick.

D. Flat Arch Construction shall not be less than 6" and all arches shall have at least two cellular spaces in the depth and unless reinforced by steel shall have a depth of not less than $1\frac{1}{2}$ " per foot of span. All arches shall be set on properly designed skewbacks that are cut to fit and protect the various beam sections. Keys of the sizes required to fit the different spans shall be provided, all arches to be keyed up in the middle third span, and any additional wedging up required, to be done with tile slabs or slate. End construction arches shall be set with the tile in a direct line between beams.

E. Segmental Arches shall have a total depth of not less than 6" having two cellular spaces in the depth and no segmental arch shall have a rise of less than $\frac{3}{4}$ " per ft. of span. Segmental arches shall be set with broken joints and be securely wedged up with tile or slate.

F. Skewbacks for all arches shall be designed to receive the thrust of arch and properly transmit same to flange of beam, the point at which thrust is supported in all cases to be above the top of beam flange supporting the arch.

12. Fireproofing where required to be furnished shall comply with the standard specifications as to absorption, compressive strength, area, weight and design for fireproofing tile as prepared by the American Society for Testing Materials serial designation C-56-26T, and all amendments thereto to date, and shall also meet special conditions as per enumerations which follow:

A. Supporting Beams, Girders, Lintels and other steel members shall be encased in hollow tile fireproofing throughout their entire length. All important beams and girders shall be incased independently of the floor arch construction, and wherever possible any openings that are required shall be left in the arch construction to avoid cutting. The minimum thickness of hollow tile fireproofing shall be as follows:

(a) **Soffit Covering** on beams carrying flat arches $1\frac{1}{2}$ ".

(b) **Covering** on beams, girders, etc., 2".

(c) **Covering** on inside projections of wall beams, lintels, etc., 2".

B. Wall Columns and Girders wherever hollow clay tile is used for fireproofing of wall columns, wall girders, or spandrel beams, etc. in exterior walls, the minimum thickness of hollow tile covering on these steel members shall be the same as that required for brick masonry covering and the thickness of solid material be at least equal to that specified for hollow tile fireproofing of interior columns. Hollow tile covering shall be well bonded and tied around columns and into the enclosing walls, and all channel spaces in wall columns shall be filled solid, same as required for interior columns. In no case shall any projection of the steel beyond the edge or face of columns, or the extreme outer edge of flanges of wall beams, or the plates and angles attached to same come within less than 2" of the exterior face of fireproof covering.

C. Interior Columns, Struts, or Other Vertical Supports of structural steel, wrought iron or cast iron, including the connection plates, shall be entirely incased and protected with hollow tile not less than 3" in thickness.

D. Beam Connections, Lugs, Brackets, Etc., attached to columns shall be covered with fireproofing of not less than 1" thickness of solid material over the extreme outer edge of metal.

E. Channel Spaces in Columns if not specified or shown to be filled with other fireproof material shall be filled with hollow tile, and the fireproof covering applied around the filled column. In all such cases all exposed steel shall be plastered with a full $\frac{1}{2}$ " coating of Portland Cement mortar as the channel filling and column covering is applied so that every bit of metal is first covered with a $\frac{1}{2}$ " coat of Portland Cement plaster.

F. Chases in Fireproof Covering shall not be cut under any circumstances and all pipe and conduit shall be kept outside fireproof covering excepting that outlets on the face of columns may have one electric conduit not exceeding $\frac{3}{4}$ " in size built into the channel filling when placed with at least 3" thickness of fireproofing material between same and the steel columns and securely built in before the fireproof covering is erected. The outside elbow shall extend out to face of fireproof covering and be solidly built in with not less than 3" thickness of tile brick or cement mortar between back and sides of outlet box and any metal.

G. Hollow Clay Tile Column Fireproofing shall be set in cement mortar as hereinafter specified and shall be securely bound with not less than No. 12 gauge wires once in every course or be tied together in every course with "U" shaped clips of No. 18 gauge band iron and shall be plastered at least $\frac{1}{2}$ " in thickness with mortar or heat retarding composition.

Note. Column Fireproofing in Warehouses where subject to damage from trucking will be protected to a height of at least 3' by metal plates or cast iron covering, but this metal covering will be furnished by the contractor for miscellaneous iron and this contractor shall co-operate with him in setting same.

13. Combination Hollow Clay Tile and Concrete Floor Construction where required shall comply with standard specifications as to material, density, absorption, compressive strength, area, weight and arrangement for combination hollow clay tile and concrete construction as prepared by the American Society for Testing Materials, serial designation C-57-26T, with all amendments thereto to date, and shall also meet special conditions as per enumeration which follows:

A. In General hollow clay tile and concrete floor construction is understood to consist of reinforced concrete joists between rows of hollow tile. When concrete topping over the tile is figured as part of the structural slab, same shall be cast monolithic with the concrete joist system. All floor slabs and beams shall have at least 4" bearing on the wall and if the bearing is on a tile wall, then a section of concrete the full length of tile wall and not less than 4" wide shall be cast over the tile wall to spread the bearing between beams and this section shall be reinforced in the direction of the length of the wall.

B. Forms shall be of such a size, lumber, and so placed as to prevent deflection and shall be provided in such quantity as not to delay the progress of the work. Care shall be taken not to remove the forms before the concrete is set. Under long spans the center row of supports shall be maintained for at least three weeks after the concrete has been poured. In cold weather, the contractor shall

leave the forms in place until directed by the Architect to remove same. No concrete shall be poured when the temperature is below 34° Fahr., unless provision has been made for heating and protecting the work.

C. Tile shall be hard burned, free from damage, imperfections and properly scored on all exterior surfaces. Joints in tile between concrete joists shall be staggered in adjacent rows by starting alternately with half and whole tile so that joints in tile will not come opposite each other in alternate rows.

D. Reinforcing Steel shall be deformed bars of hard grade steel offering a mechanical bond with the concrete. Reinforcing shall be free from mill or rust scales and shall be imbedded not less than one diameter nor less than $\frac{3}{4}$ " away from the exterior face of all concrete. Sizes of reinforcing shall be determined by the span and load to be carried as indicated on structural drawings.

(a) **Reinforcing** shall be supported with chairs and wired or otherwise tied in position so as to hold position during the process of placing concrete, substantially as shown by detail drawings.

(b) **Temperature and Expansion Reinforcement** shall be placed on top of tile running continuously in direction opposite to the direction of the length of joists consisting of not less than $\frac{3}{8}$ " bars placed not to exceed 16" o.c. and lapped not less than 8" at all splices, or in lieu of $\frac{3}{8}$ " bars approved fabric may be substituted of approximately equal weight and not less than 4" mesh.

E. Wheeling Planks shall be supported above the tile and reinforcing in such a manner as not to cause breakage of tile by vibration when wheeling over same or not to cause displacement of reinforcing.

F. Concrete used in floor construction shall consist of 7½ gal. water to one cu. ft. best American Portland Cement, to two cu. ft. clean sharp sand, torpedo or equal which will pass a $\frac{1}{4}$ " mesh, and 3½ cu. ft. crushed stone or gravel of such a size as will pass through a $\frac{1}{2}$ " mesh and be retained on a $\frac{1}{4}$ " mesh.

(a) **Concrete** as placed shall be well spaded and worked around reinforcing after pouring so as to make a solid, dense concrete which shall be perfectly bonded with the reinforcing and entirely free from voids.

(b) **The Placing of Concrete** shall be a continuous operation and the full depth of floor shall be poured at one time.

(c) **All Tile** should be wet before concrete is poured to effect good bonding. Soaking is not permissible. In pouring the ribs the concrete shall not be dumped into the joist, but on the previously placed concrete and worked forward, allowing the mortar to flow ahead in the joist.

(d) **Cessation-of-the-Work Joints** whenever required to be made shall be made exactly in the center of spans by setting vertical stop off dams and wherever cessation-of-the-work joints are made there shall be inserted in same metal stubs or dowels of sufficient number and area to develop at least three-fourths of the complete computed compressive strength of the concrete at the joint without reliance on butted joints in concrete, in excess of $\frac{1}{4}$ its computed strength. These stubs shall extend into the concrete on each side of the bond not less than 4". Under no circumstances shall stop-off joints be left with an incline from the vertical.



Chicago Daily News Building

Holabird & Root, Architects

Rustic & Standard Buff and Standard Gray Indiana Limestone

INDIANA LIMESTONE *The* NATION'S BUILDING STONE

Beautiful

Everlasting

Low in Cost

INDIANA LIMESTONE COMPANY

GENERAL OFFICES, BEDFORD, INDIANA

STANDARD FORM OF CUT STONE SPECIFICATION

For Indiana Oolitic Limestone

INDIANA LIMESTONE OR BEDFORD STONE

Indiana Limestone constitutes one of the great natural resources of the country. The industry has grown to such an extent that it is in no sense local or sectional but national in character, and since this stone is so extensively specified by Architects, these grading rules, specifications and notes regarding its use have been included.

The Indiana Limestone Organizations through their Architects' Service Bureau offer free technical service to Architects, who are requested to make use of these Service Bureaus as a source of reliable and impartial information regarding the products of the industry and their proper and economical use, and for assistance on any problems pertaining to Indiana Limestone and its employment in building construction.

Notes on Standard Specifications for Indiana Limestone

THE SELECTION of the kind or grade of stone to be used for a particular building often does not receive the careful consideration which it deserves. When a building is intended to become the art or cultural center of a community, its administrative headquarters, or the realization of the life dream of some influential citizen, it is natural to think that only the very best is good enough. In such cases, there is a temptation to specify the fine-textured "Select" or what is really selected stone, the highest in cost, for all parts of the work. This is rarely necessary or desirable.

All grades of Indiana Limestone are equal, in so far as soundness is concerned. The production processes employed in a cut stone mill, further, are such as will automatically eliminate any blocks or pieces that contain planes of weakness, as the stresses set up in machining the stone and in handling it by the travellers from one machine to another, in the average run of work are greater than would be permitted in building, and serve to test effectively all of the stone as it passes through the various milling operations necessary to shape and prepare it for its position in the building.

For many types of structures, especially for sawed-finish wall facing, the Old Gothic grade, which is decidedly low in cost, is the most fitting to use. The moderate cost Variegated grade is suitable for all purposes, either for trim or for all stone faced buildings.

During the past few years the proportionate use of the Gray stone on account of its fine, close, even texture has been rapidly increasing. Many architects now prefer and specify it regularly, on account of its density, uniformity and fine weathering qualities, together with dignity and pleasing color-tone which becomes progressively lighter in shade with the passing years. It most effectively resists the accumulation of grime and in appearance is the nearest approach to a costly light-colored fine grain granite that it is possible to secure in the field of an easy-working, moderate cost building stone. Architects will never regret specifying this material for their finest work, as exemplified by some of the finest buildings in America that have been constructed of it.

UNIFORM CLASSIFICATION OF INDIANA LIMESTONE.

With descriptions of the grades as adopted by the Indiana Limestone Institute Sept. 26th, 1928.

Regular Classification.

Select Gray	Standard Buff
Standard Gray	Rustic Buff
Rustic Gray	Variegated
Select Buff	Old Gothic

Special Classification.

Buff Statuary Stock	*Special Hard Gray
*Special Hard Buff	

*These grades "Select" in texture.
Standard Practice—Samples.

The submitting of two samples showing the maximum and minimum or fineness and coarseness of texture has been adopted as "standard practice," thus showing the range of variation from uniformity instead of only one sample intended to indicate the average run of the particular grade—except in the case of "Statuary Buff" where a single sample will usually suffice, and in the case of Old Gothic, the characteristic range of which cannot be appropriately shown by only two samples and for which grade there is no fixed limit as to variation in texture and formation, or as to markings that are characteristic of the material.

Descriptions of the Grades defining the range of variation in texture and the markings that are characteristic of and permissible in the various grades under the Indiana Limestone Institute system of grading.

Select Gray.

"Select Gray" stock is sound and durable and shall embrace the average finer grained Gray stone, in texture ranging from the finest, most uniform grained stock to stone having an average grain, as shown by the samples and photo reproductions thereof designating the range of this grade. It shall include stone in which any openness of grain does not show pore spaces exceeding about one m. m. (1/25 inch) in diameter and in which tight fine opaque white or glass-like calcite streaks or veins not exceeding one m. m. (about 1/25 inch) in width, may occur and will include stone having occasional solid fossils and grains, crystals or spots of calcite. Pit-holes not exceeding six m. m. (about 1/4 inch) in diameter may occur, providing that there are not more than the equivalent of one of these to any ten square feet of area of slabs, nor more than 15% of the cube of blocks so affected, and in which any of these allowed minor variations in the formation and texture do not constitute a defect that impairs the strength and durability or appearance of the fabricated and finished stonework produced therefrom, and when appreciably affecting the appearance are such that can be eliminated readily from appearing on the face of stonework in the finished building.

Standard Gray.

"Standard Gray" stock is sound and durable and is the average of the moderately large grained Gray product of the quarries that constitutes the bulk of the total output of gray stone and is therefore classed as "Standard." This grade has certain variations in density, color-tone and texture not allowed in "Select" and may contain streaks of calcite or moderately coarse grained or reedy formation and small pit-holes, providing such variations in texture and color-tone do not exceed the following limits, or impair the strength or durability of the stone.

Texture or grain ranging from Select to a somewhat shelly appearing formation having

The NATION'S BUILDING STONE



Medinah Athletic Club
Walter W. Ahlshlager Inc., Architects
Rustic Buff Indiana Limestone

Chicago Tribune Tower
Howells & Hood, Architects
Old Gothic Indiana Limestone

The facilities of this company for serving the architectural profession are unequalled and embrace the following:

Most of the old established quarries in the district, which have produced the finest stone for generations; 17 sawing mills and 25 cutting plants, fully equipped with all of the latest developments in stone working machinery.—

Annual Capacity:	Rough stone stock	16 million cu. ft.
	Sawed stone stock	6 million cu. ft.
	Finished cut stone	4 million cu. ft.

Every practicing architect should have on file the Company's latest Specification Manual and other literature, especially ILCO Details and the booklet on Random Ashlar.

Address Architects Service Bureau, P. O. Box 308, Bedford, Indiana.

INDIANA LIMESTONE COMPANY

EXECUTIVE OFFICES: TRIBUNE TOWER, CHICAGO

an average grain, as shown by samples and photo reproductions thereof designating the range of this grade.

White calcite or crystalline streaks, not over four m.m. (about 1/6 inch) in width, nor more than one such marking in any 30 square feet of stone so affected.

Glass-like calcite streaks or veins not over two m.m. (about 1/12 inch) in width nor more than one such defect in any 30 square feet of stone so affected.

Coarse or open texture bands averaging not over one inch in width, nor shall not aggregate over 6% of the measurement across grain.

Pit or shell holes aggregating not over one square inch in area to any 30 square feet of stone.

Stock to be well cemented and with the exception of the pit-holes and coarse somewhat open-textured streaks allowed, shall not be visibly open or porous in general structure.

Rustic Gray.

"Rustic Gray" stock is sound and durable and shall embrace the coarser more or less open shelly grained Gray stone, having a varying amount of crystalline calcite intermixed, including stone having a decidedly coarse structure with some honey-comb formation, as shown by the samples and photo reproductions thereof designating the range of this grade. Rustic Gray by the nature of the deposit will generally be somewhat denser in formation than Rustic Buff, and regardless of its coarse shelly texture usually be practically free of any very open grain stone of more or less cellular formation like travertine, such as is characteristic of and will occur in the Rustic Buff grade, but may include some stone which is darker in color-tone, some stone with streaks of fine texture and some stone that is quite hard, due to the size and amount of crystalline calcite that it contains. This grade, like Rustic Buff, is coarser and more varying in texture, and shows a wider range of granular formation and variation in color-tone than any of other grades, excepting "Rustic Buff" and "Old Gothic."

Select Buff.

"Select Buff" stock is sound and durable and shall embrace the average finer grained stone, in texture ranging from statuary stock in which minor surface markings occur, to stone having an average grain as shown by the samples and photo reproductions thereof designating the range of this grade. It shall include stone in which any openness of grain does not show pore spaces exceeding one m.m. (about 1/25 inch) in diameter and in which tight fine opaque white or glass-like calcite streaks or veins not exceeding one m.m. (about 1/25 inch) in width may occur, and will include stone having occasional solid fossils and grains, crystals or spots of calcite. Pit-holes not exceeding six m.m. (about 1/4 inch) in diameter may occur, providing that there are not more than the equivalent of one of these to any ten square feet of area of slabs, nor more than 15% of the cube of blocks so affected and in which any of these allowed minor variations in the formation and texture do not constitute a defect that will impair the strength and durability or appearance of the fabricated and finished stonework produced therefrom, and when appreciably affecting the appearance are such that can be eliminated readily from appearing on the face of stonework in the finished building.

Standard Buff.

"Standard Buff" stock is sound and durable and is the average of the moderately large grained Buff product of the quarries that constitutes the bulk of the total output of Buff stone and is therefore classed as

"Standard." This grade has certain variations in density, color-tone and texture not allowed in "Select" and may contain streaks of calcite or moderately coarse grained or reedy formation and small pit-holes, providing such variations in texture and color-tone do not exceed the following limits, or impair the strength or durability of the stone.

Texture or grain ranging from Select to a somewhat shelly appearing formation having an average grain as shown by samples and photo reproductions thereof designating the range of this grade.

White calcite or crystalline streaks, not over four m.m. (about 1/6 inch) in width, nor more than one such marking in any 30 square feet of stone so affected.

Glass-like calcite streaks or veins not over two m.m. (about 1/12 inch) in width nor more than one such marking in any 30 square feet of stone so affected.

Coarse or open texture bands averaging not over one inch in width nor shall not aggregate over 6% of the measurement across grain.

Pit or shell holes aggregating not over one square inch in area to any 30 square feet of stone.

Stock to be well cemented and with the exception of the pit-holes and coarse somewhat open-textured streaks allowed shall not be visibly open or porous in general structure.

Rustic Buff.

"Rustic Buff" stock is sound and durable and shall embrace the coarser and irregular, more or less open shelly grained stone, having a varying amount of crystalline calcite intermixed, including stone having a decidedly coarse somewhat honey-comb or reedy formation, as shown by the samples and photo reproductions thereof designating the range of this grade. It may include some stone which is appreciably darker in color-tone, some stone with streaks of fine texture and some stone that is quite hard, due to the size and amount of crystalline calcite that it contains. This grade is therefore distinctly coarser and more varying in texture, showing a wider range of granular formation and more variation in color-tone than any other grade, except "Old Gothic."

Variegated.

"Variegated" stock is sound and durable and shall embrace the irregular mixture of the Buff and Gray color-tones which occur in the blocks that are quarried where the Buff and Gray color-tones adjoin in the quarry ledges and includes stone showing variation in texture as well as the variation in color-tone, as shown by the samples and photo reproductions thereof designating the range of this grade.

"Variegated" stock includes stone that may vary in texture from the lower range of "Standard" up through "Select" as herein graded by texture and consequently from moderately large to quite fine grained stone and will include some stone containing streaks or veins of crystalline calcite and bands or areas of shelly formation that do not affect the structural soundness of the stone, or make the stone stock too coarse or variable to be used for the average run of "cut stone" work, trim, etc.

The coarser grained and more variable of the vari-Buff-Gray color-toned stone that is equivalent to Rustic Buff or Rustic Gray in texture, shall be included in the "Old Gothic" classification.

It is understood that while the quarry blocks shall contain stone of both color-tones, that Variegated stock when cut up for building purposes, will, in the finished work, produce pieces of solid Buff and solid Gray and only a certain percentage of stone with the two color-tones in one piece.

The NATION'S BUILDING STONE



Pickwick Theatre and Store Building, Park Ridge, Ill.

Zook & McCaughey, Architects

Entire exterior of Variegated Indiana Limestone

THE motion picture has today become an important factor in the everyday life of the nation and in consequence many of the picture houses now erected are constructed in the most permanent manner of the richest materials obtainable. Rich, restful, handsome effects and greater dignity are now sought for in place of the gaudy, bizarre appearance; and, in the exterior of some of the more recent buildings, a distinct note of permanence and quiet dignity has been expressed.

Even in the distinctly modernistic design shown, a sense of strength, of massive permanence is obtained entirely beyond the possibility of any of the cheaper substitutes formerly so frequently found in this type of building.

It is no idle prediction that as time goes on an ever increasing trend towards well designed picture houses with permanent exteriors will take place.

The architect or builder of the motion picture house of today cannot afford to neglect this tendency, nor the advantage that is to be gained by the impression that can be made upon the public through interesting buildings constructed of pleasing light-colored natural stone, the durable exteriors of which will be permanently attractive and therefore a preferred investment from both the building owner's and showman's stand points.

Freedom from costly repair and upkeep expense is a factor that is worthy of careful consideration in building structures of any type.



Architects' Service Bureau

P. O. Box 308

Bedford, Indiana

Old Gothic.

This grade of stock is sound and durable and embraces Gray, Buff and Variegated. It includes stone of pronounced texture, unselected as to color, ranging from a fine to a distinctly coarse grain, and may contain shelly, honey-comb formations with both white and dark crystalline streaks or streaks of glass-like calcite and tight crow-feet, none of which, however, affect the structural soundness and weathering properties of the stone. For this grade of stone there is no fixed limits as to variation in texture, general formation and surface markings, and when the material is fabricated some pieces will be produced in solid Buff and in solid Gray.

Special Hard Gray.

"Special Hard Gray" for the purpose of grading is classed as "Select Gray." It is the fine grained, hard, dense, stone similar to the regular Select Gray grade in texture and may be included as such, but as a grade by itself, shall be specially selected for its hard, dense, usually somewhat crystalline texture, making it particularly suitable for grade or base courses, steps, platforms, floor tiling, paving and other walkway surfaces.

Special Hard Buff.

"Special Hard Buff" for the purpose of grading is classed as "Select Buff." It is the fine grained, hard, dense stone similar to the regular "Select Buff" grade in texture and may be included as such, but as a grade by itself, shall be specially selected for its hard, dense, usually somewhat crystalline texture, making it particularly suitable for grade or base courses, steps, platforms, floor tiling, paving and other walkway surfaces.

Statuary Buff.

This grade covers only the very fine uniform grained Buff stock sold principally for sculpture and carved doorways, tracery, sculptured panels, memorials and elaborate interior work.

In texture the grain shall not exceed one millimeter (about 1/25 inch) in cross-section, visibly uniform and well cemented in structure and entirely free from seams, streaks and pit-holes, and without calcite crystals larger than four millimeters (about 1/6 inch) in diameter.

Certain specialties, from individual quarries that will range in color-tone from very light, almost a cream white, to distinctly dark, are also usually available, samples and descriptions of which will be furnished upon request.

Architects should remember that this system of classifying the Industry's product is for their direct benefit and the protection of their clients in the specifying of Indiana Limestone. The well-known Oolitic Limestone of Indiana, formerly called "Bedford Stone," is commercially available only in Lawrence and Monroe Counties, and the architect should protect both his client and himself against substitutes. All of the long established and proven quarries from which this dependable stone has been produced for generations are located within these two counties.

SPECIFICATION FOR CUT INDIANA LIMESTONE.

1. Work Included:

The work under this contract shall include all labor and material for the furnishing of cut stone work in accordance with the drawings and as hereinafter specified.

2. Description of Stone.

All Limestone specified or shown on drawings shall be Indiana Oolitic Limestone building stock, free from all defects that

would materially impair its strength, durability or appearance, and within the range of variation of color and texture represented by two samples approved by the Architect.

Specially graded stone, acceptable as to hardness and color, as per samples to be submitted, shall be employed where indicated on drawings, for and all other positions in contact with the soil or exposed to direct wear.

Wherever the terms "Indiana Limestone" or "Limestone" occur in this specification, they specifically refer to and shall imply "Indiana Oolitic Limestone" quarried in Lawrence or Monroe Counties, Indiana, all such stone to be from a quarry the product of which has been tested at the U. S. Bureau of Standards for physical properties and weathering with satisfactory results.

3. Finish.

The finish on exposed surfaces generally, except where tooling or carving is indicated, shall be smooth, machine-dressed, showing no tool marks.

4. Samples.

The contractor shall submit to the Architect two samples which shall be typical of the extremes which the contractor proposes to furnish. Samples to be about 3 1/2" wide by 7" long by about 3/4" thick, produced with the large faces cut across the grain of the stone, the finish specified to be indicated on the large faces and at least two of the edges to be rock face. Similar samples shall be provided when "special hard" stone or any other grade of stock is specified for certain positions in the building.

All samples shall be labeled or otherwise clearly marked with the grade of the Limestone, the name of the contractor submitting them, and with the statement: "Samples of Indiana Limestone to be furnished for the Building."

5. Standard Practice.

The standard practice established by the former Indiana Limestone Quarrymen's Association of Bedford, Ind., along with the grading rules of the Indiana Limestone Institute, shall govern, except where these are in direct conflict with the specific intent of the Architect's specifications or detail drawings. Bidders not familiar with the existing standards relating to the grading, cutting, setting and anchorage practice, etc., are cautioned to inform themselves regarding them.

The Architect reserves the right to approve the sub-contractors for both the cutting and setting of the stone, before this portion of the work is awarded.

6. Cutting & Setting Drawings.

The cut stone contractor shall prepare and submit to the Architect for approval, complete cutting and setting drawings, in triplicate, for all of the Limestone work under this contract and no stone shall be cut until these drawings are approved by the Architect. Such drawings shall show in detail the sizes, sections and dimensions of stone, the arrangement of joints and bonding, anchoring and other necessary details.

These drawings shall be based upon and follow the drawings and full-size details prepared by the Architect, except where it is agreed in writing that changes be made. Each stone indicated on these drawings shall bear the corresponding number marked on the back or bed with a non-staining paint.

7. Bonding & Anchorage.

All projecting stones, except where otherwise shown as anchored to the structure, and so provided for by details on setting drawings, shall have beds in the wall at least one-inch greater in depth than their maximum projection.



The Gymnasium Bldg. of Presbyterian Theological Seminary

Dwight G. Wallace, Architect

Indiana Limestone

furnished by

Fluck Cut Stone Company, Inc.

Cut Stone Contractors

Largest and most modern equipped plant in Chicago

1229-43 East 74th Street

Telephones Dorchester 1310 and Dorchester 1311

CHICAGO

Moulded projecting courses, unless shown as secured by suitable anchorage or steel supports, shall have not less than four-sevenths (4/7) of their cubic contents inside the face of wall. There shall be "through" or bond stones whenever indicated on the architect's drawings upon which contract is based.

Provision for the proper anchoring, doweeling and cramping of work in keeping with standard practices, also for the support of stone by shelf angles and loose steel, etc., when required, shall be clearly indicated on the setting drawings.

8. Details for Lintels, Etc.

Lintels, architraves and other members spanning openings, whether supporting a superimposed load or only their own weight, shall be of the proportions and sectional area that will provide an ample factor of safety based on the average ultimate breaking strength of the stone specified.

9. Carving & Models.

All carving shall be done under this contract by skilled carvers in a correct and artistic manner, in strict accordance with the spirit and intent of the Architect's sketches, or from plaster models provided or approved by the Architect.

All carving to be executed

Contractor shall include in his estimate the sum of to be expended by the Architect for the models that are required.

10. Cutting.

All stone shall be cut accurately to shape and dimensions and full to the square, with jointing as shown on approved "cutting and setting" drawings. All exposed faces shall be cut true. Beds and all joints shall be dressed straight and at right angles to the face, unless otherwise shown, and except where otherwise shown or noted on drawings the joints shall have a uniform thickness of 1/4 inch.

The patching or hiding of defects will not be permitted.

Washes shall be as deep as practicable and drips of sufficient width and depth to shed water shall be provided on all projecting stones and courses.

Raglets for flashing, etc., shall be cut in the stone where so indicated on the architect's drawings.

Moulded work shall be carefully executed from fullsize details, supplied by the Architect, and must match perfectly at joints. All arrises shall be sharp and true.

Quoins, Pier and Pilaster stone shall be checked at back as indicated.

All columns shall be accurately cut with the entasis shown on drawings. All pilasters to be cut straight without entasis or taper.

11. Back Checking & Fitting to Structural Frame.

Stone coming in contact with structural work shall be back-checked as indicated on the general drawings, and where shown resting on structural work shall have beds shaped to fit the supports.

12. Lewis Holes & Cutting for Dowels, Anchors, Cramps, Etc.

Holes and sinkages shall be cut in stones for all anchors, cramps, dowels, etc., called for under this specification or indicated on the "cutting and setting" drawings.

Lewis holes shall be cut in all stones weighing more than 100 pounds. No Lewis or other holes shall be cut in exposed washes or come closer than 2 inches to the exposed face of the stone.

13. Cutting and Drilling for Other Trades.

This contractor shall do all cutting and drilling of stone for electric conduits, piping, leaders, etc., required for the installation of

the work of other trades, when definite information is given on architect's details.

14. Field Cutting.

Specify in detail any field cutting that will be required.

15. Loading & Shipment.

The Cut Indiana Limestone shall be carefully packed for rail or wagon transportation, with exercise of all reasonable and customary precautions against damage in transit.

All cut stone under this contract shall be delivered promptly as ordered by purchaser and in the sequence in which it is to be set.

SETTING CUT STONE.

16. Work Included.

Contractor shall refer to the preceding specification for Cut Indiana Limestone for more detailed information regarding the Cut Stone that is to be set under this contract; also refer to "General Masonry," "Sheet Metal Work," "Roofing" and "Carpentry" specifications for references to other work that must be executed in conjunction with this work.

17. Delivery & Storage.

All Indiana Limestone delivered f. o. b. cars at destination under contract shall be carefully unloaded and delivered to the building site.

The Cut Stone shall be handled throughout by competent workmen and by such methods as will guard against soiling, mutilation or snipping in transit to and upon delivery at the building site.

The stone shall be stored at the building site on planking set so that the stone will rest entirely clear of the ground and be protected by proper means from damage to arrises and from contact with anything which would result in the accumulation of dirt, dust, soot, mud, grease and other staining or disfiguring elements. The stone shall be covered with tarpaulin, stout non-staining paper or boards during extended periods of storage at destination or building site.

18. Setting Mortar.

All Indiana Limestone shall be set in a carefully prepared non-staining mortar. (See Alternate Mortar Clause which follows.)

Note:—The following three alternate setting mortar clauses; one for a cement mortar, one for a 50-50 mortar and one for a lime mortar, any one of which may be used according to the conditions which make each one the more appropriate for the particular piece of work. The lime mortar clause is recommended principally for what may be referred to as all lime mortar masonry jobs in which that type of mortar is to be used for laying up the backing as well as for setting the stone facing.

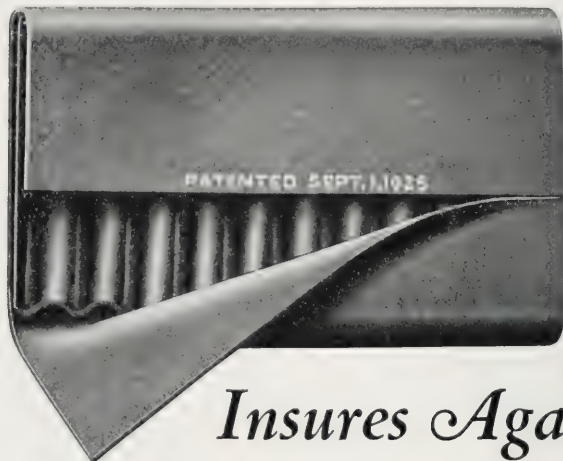
The 50-50 mortar clause is recommended both for the setting of stone in masonry walls where another type of mortar is to be used in laying up the backing, and for light walls in which it can be used both for setting the stone and laying up the backing.

The cement mortar clause is always to be recommended for both setting and parging the back of the stone, where a cement mortar made of ordinary cement, either Portland or brick masons of any questionable kind is to be used in the backing masonry and especially for the enclosure walls of skeleton frame structures where both a strong mortar is desirable and where a dense reasonably impervious mortar that will protect the stone where it is built in place against concrete column and beam construction or fireproofing is all important.

For that reason preference is usually given to the use of a cement of the non-staining type either containing or mixed with a suitable integral waterproofing as the most practical and effective means of protecting the stone from the staining effects of moisture coming through from the backing or structural work in back of limestone facing.

COWING JOINT

A Pressure Relieving Joint For Masonry



Insures Against Occurring Stresses In Buildings

IN stone, terra cotta or marble buildings, regardless of the rigidity of the structural steel or reinforced concrete frame, there are movements which occur that will create an oversteering of the facing material at various points. These movements may be caused by compression of the steel, vibration, wind action or unequalized expansion or contraction between the frame and the facing material due to temperature changes.

Where these movements occur—if there is not some elasticity in the face of the building—there will be some cracked facing blocks due to oversteering.

The Cowing Joint, installed in place of one mortar joint at each story height provides the needed elasticity. It gives exact and automatic compensation for all destructive stresses thrown on the facing material.

It is made to fit the templet of the piers . . . is neat . . . will not squeeze out . . . eliminates frequent tuck-pointing . . . is everlasting.

Some Installations

Tribune Tower	Chicago
Merchandise Mart	Chicago
Mather Tower	Chicago
Foreman Bank	Chicago
Carbide-Carbon Bldg.	Chicago
First National Bank	Detroit
Fisher Building	Detroit
Penobscot Building	Detroit
Union Trust Building	Detroit
Koppers Building	Pittsburgh
Union Depot Tower	Cleveland
Midland Bank Bldg.	Cleveland
Forshay Tower	Minneapolis
Nebraska State Capitol	Lincoln
Church Heavenly Rest	New York
1500 Lake Shore Drive	Chicago
Rand Building	Minneapolis
Yeates Medical Bldg.	Minneapolis
N. W. Bank Bldg.	Minneapolis
Pennsylvania Terminal	Philadelphia
One N. LaSalle Bldg.	Chicago
Lee-Higginson Bldg.	New York
McGraw-Hill Bldg.	Chicago
Santa Fe Office Bldg.	Amarillo, Tex.
Boody Bldg.	Toledo
Memorial Bridge	Harrisburg, Pa.
C. P. Ry. Bldg.	Toronto, Canada



[Include Cowing Joint in the specifications. Estimates will be furnished promptly.]

Cowing Pressure Relieving Joint Co.

160 N. Wells Street

Tel. Franklin 5935

Chicago, Ill.

A. Cement Mortar.

All Indiana Limestone shall be set in a carefully prepared non-staining mortar composed of 1 part of approved brand of non-staining cement to 3 parts of sharp, clean washed sand with the addition of 1/5 part of Hydrated Lime.

B. Cement-Lime Mortar.

All Indiana Limestone shall be set in a carefully prepared non-staining mortar composed of 1/2 part of approved brand of non-staining cement, 1.2 part of Hydrated Lime or lump lime paste to not over 3 parts sharp, clean washed sand.

C. Lime Mortar.

All Indiana Limestone shall be set in a carefully prepared non-staining mortar composed of 1 part of Hydrated Lime or lump lime paste to not over 3 parts sharp, clean washed sand with the addition of non-stained cement in an amount equal to at least 15 per cent by volume of the lime used.

When lump lime is to be used the paste shall be made from the best quality of freshly burned lump lime, slaked with cold water and screened through a 1/8 inch mesh screen into a settling box, following the practice employed in preparing lime for plastering. The lime putty thus prepared shall stand in the settling box not less than one week and then be mixed with sand and be properly stacked to age; the cement to be added and thoroughly worked into the mixture in small batches just prior to its use for the setting of cut stone.

Note:—The following clause will apply for all three types of mortar.

The sand must be WASHED entirely free from loam, silt, vegetable matter, salts and all other injurious substances, and shall be screened if containing pebbles or coarse grains that would interfere with the proper bedding and jointing of the work. The water shall not be alkaline and must be clear and devoid of salts and injurious elements.

19. Scaffolding.

The scaffolding required for the use of all Trades, including scaffold for the proper execution of the Cut Stone work, will be furnished and erected by the Masonry Contractor.

20. Centering.

The wood centering required for the proper setting of Cut Stone work will be furnished and erected by the Carpentry Contractor.

21. Anchors & Dowels.

All anchors, cramps, Lewis anchors, etc., required by setting drawings or necessary for the proper erection of the work shall be included under stone setting contract. Except where otherwise specified, all anchors shall be of iron, thoroughly galvanized after they have been bent to shape.

Anchors for ashlar and face work generally shall be the standard 5/8"x1" ashlar anchor or be of equivalent cross-section, one anchor to each stone over one-half square foot in area and at least two anchors to all stone over 2'-0" long or more than 3 square feet in superficial area.

All dowels required for light stone work shall be made of standard heavy brass pipe of the size required.

22. Grade Course.

Where the Limestone extends down to the grade-line, the stone work above the grade shall be protected by a properly installed layer of approved non-staining impervious material.

23. Setting Cut Stone.

The Indiana Limestone shall be set accurately in accordance with the requirements of the drawings. Before setting, all stone shall be washed **clean on all sides** and, if required, shall be scrubbed with fibre brushes using only soap powder and water and then be thoroughly rinsed with clean water. Just prior to setting, all stone shall again be sponged or drenched on all sides with clean water.

All stone shall be properly set by competent stone setters, true to line and level, with full flushed joints, filling all anchor holes.

All beds and vertical joints shall be 1/4 inch in width, except where otherwise indicated. Wood wedges may be used only where necessary to prevent the crushing of mortar under heavy blocks, and shall be thoroughly soaked before use.

Mortar shall be raked out 3/4 inch from the face of stone to allow for pointing; excepting for such parts of the work as may best have the joints pointed or grouted full as set. The stone as set shall be sponged off along all joints.

Steps shall be set with a slight pitch to the front.

The ends only of lugged sills shall be bedded with mortar, balance of joint to be left open until pointed.

Heavy stone or projecting courses shall not be set until the mortar in courses underneath has hardened, all projecting stone to be securely propped until the wall above them is built.

All cornices, copings and projecting belt courses and all stones forming gutters, etc., shall be set with the vertical joints unfilled. The exterior profile of these joints shall then be caulked with rope yarn or picked oakum and be filled solid from above with a mortar grout composed of one part non-staining cement and one part fine white sand, mixed in small quantities, and of as thick a consistency as can be poured into the joints. Grout shall be stirred vigorously until used.

Splashing exposed faces of stone with mortar shall be avoided and any splashings be immediately removed with a clean sponge and water.

24. Parging & Backing Up.

The backs of all stones and the sides of bonding stones shall be parged with the setting mortar not less than 1/2 inch thick before backing is built. *The first course of brick in back of stone shall be laid in this same kind of mortar.* Where the stone occurs as a facing applied direct to previously erected structural members, both back of stone and face of structural work shall be plastered with setting mortar and any space left be grouted where this is required, to insure a thoroughly filled back-joint.

25. Protection of Finished Work.

Contractor setting Cut Stone shall cooperate with the Carpentry Contractor, who will furnish and erect the necessary protection for sills and all projecting stonework. All steps and platforms shall be protected with boards during the entire period of construction.

26. Replacement Damaged Stone.

No defective stone, and no broken, spalled, patched or otherwise damaged stone shall be set without first obtaining the Architect's approval. All damaged stone shall be recut or repaired, if approved, or be replaced by the contractor free of cost to the owner.



Medinah Athletic Club, Chicago, Ill.

Walter W. Ahlschlager, Architect

Archer Stone Setting Co.

Incorporated

GEO. B. ARCHER, President

Phone, Office: Franklin 4480

228 North La Salle Street, Suite 848
CHICAGO, ILL.

27. Pointing.

All face joints shall be raked and brushed out clean to a depth of at least $\frac{1}{2}$ inch, carefully removing any wedges and loose mortar so that pointing will be continuous, and after a thorough wetting of the stone the joints shall be pointed flush with mortar consisting of one part non-staining cement, two parts clean white sand and sufficient cold lime putty to make as stiff a mixture as can be worked.

28. Cleaning.

The face of all stonework under this contract shall be properly cleaned down upon completion; if necessary, this cleaning shall be done with a suitable steam cleaning process approved by the architect or by scrubbing with soap powder boiled in clean water, applied vigorously with stiff fibre brushes, adding clean, sharp, fine sand to the soap and water mixture, drenching all exposed surfaces of stone with clear water after cleaning, or in lieu of that method be cleaned down with a suitable steam cleaning process approved by the Architect.

The use of wire brushes or acids of any kind will not be permitted under any circumstances for cleaning the stonework.

Note: Where the contractor has thoroughly cleaned the stone before its erection, the cleaning down upon completion may often be omitted, or at least consist only of the removal of mortar droppings and the brushing off of stone, together with the careful sponging off of mortar smears along the joints as pointing progresses.

Notes on the Design of Structural Steel for Skeleton Frame Buildings That Are to Be Faced With Stone.

It is really very important that more careful consideration be given to the requirements of the facing material in the preliminary layout of structural steel work than is often the case.

The facing material, along with the details of support for enclosure walls, is very often studied only after the size and position of columns, girders and main beams, including even the spandrel members, have been fixed. This is not the best method of procedure, as a careful study of the spandrel sections during the preliminary stages of design and layout of the structural frame will often result in considerable economy in the steel work.

Details for spandrel sections should be carefully worked up in pencil during the early stages of preparing the small scale drawings, enabling them to be studied along with the architectural features of the design and before the column centers and other lines have been definitely fixed, not afterward.

It must also be remembered that masonry, particularly cut stone work, is decidedly more rigid than steel, and the steel work for its support should be designed with this fact in view. Any attempt to support walls or lintels over wide openings with shallow steel sections that will deflect appreciably under load, will cause arch action in the super-imposed masonry so that the load will be carried by the masonry instead of being transferred to the beam in accordance with the design. When this occurs, parts of the masonry walls may be subjected to stresses so excessive that crushing or opening of the joints or even spalling of the corners or cracking of the masonry sometimes results. This may often mean that a single, deep, built-up plate-and-angle girder is preferable to a plain rolled section or combination of shapes for spandrel members.

For similar reasons, it is better to carry the entire spandrel load on a single beam or

girder than on two or more separate ones. The weight of steel will usually be less, the beam stiffer and all the steel will act together.

In many cases, provision should be made for adjustment of shelf angles, outlooks, etc., at the time stone is set. This may be accomplished by the use of slotted bolt holes, washers, and bolts of adequate length. On account of this requirement for adjustment, loose angles, channels, etc., for the support of stone are much easier to set and, consequently, are preferable when the above requirement for stiffness can be adequately met.

A similar point is so to detail the work that the stone facing will not be pinched between supporting members of the structural frame when movements occur due to changes in temperature, wind stresses, etc. Thermal expansion of limestone, under temperature changes occurring in a building, are very much less than that of steel.

Stone lintels should be made self-supporting whenever practicable. This is usually possible, even in paired or grouped windows, by the use of stone mullions, which give a better appearance and greater structural stability to any stone design. This often simplifies the spandrel sections, since in this case only the spandrel panels and sills need be supported by the structural frame.

There is also a tendency to place wall columns too close to the face of outside walls. In the shaft or main portion of the building, it is usually advisable to fix the center line of these columns in a position that will provide room between the outer face of the steel and the normal face of the wall for the stone facing and one course of brick work, plus the proper allowance for joints. With columns placed in this position, the eccentric loading from walls can generally be balanced by the eccentric loading from floor girders, and this will usually permit the flanges for the regular plate-and-angle columns to be turned out towards the face of the wall, where they best serve for resisting wind stresses and for wind bracing connections, permitting the floor girder connections to be placed on the opposite flange of these columns.

It is also very important in the erection to be sure that the frame is carrying all of the enclosure wall load which it is intended to carry, and that this load is not being supported largely by the facing through the deflection and settling to bearing, of the steel work behind it. This may often mean that in tall buildings the erection of stone facing and backing of enclosure walls should be started simultaneously at several different floor levels, and the entire enclosure walls of the shaft and upper portions of the building be completed before the stone work of base or lower stories is set.

It may not always be found practicable to do this, but the one point is to be sure that the frame is carrying the full load of upper walls, particularly when there is an arcade or colonnade treatment of stone work forming the base portion of a tall building as stone work of this character in lower portion can usually be made self-supporting for several stories in height, and for that reason steel should be kept out of it as far as practicable.

A little careful study given to details of this kind during the early stages of the steel design will usually result in the simplification of both the structural steel and the stone work, facilitate the erection of both, and reduce the cost.



Dock Property and Yards of

BISHOP LUMBER CO.

2315 ELSTON AVENUE
CHICAGO, ILL.

We solicit your inquiries for Oak and Fir Timbers and Dimensions.
We also stock everything you need
in Structural and Factory Lumber.

Telephone Humboldt 0383

Inquiries Solicited

Satisfaction Guaranteed

"Millions of Feet at Your Service"

NEW LUMBER STANDARDIZATION

SIMPLIFIED PRACTICE RECOMMENDATION ON LUMBER

In accordance with the unanimous action on December 12 to 13, 1923, April 22, 1924, May 1, 1925, April 27, 1926, and May 3, 1928, of the general conferences of representatives of manufacturers, distributors, wholesalers, retailers, and users of lumber, and representatives of architects, engineers and general contractors, and with similar action on December 7, 1928, of the Central Committee on Lumber Standards, acting with the delegated authority of the General Conference, the United States Department of Commerce, through the Bureau of Standards, recommends that recognized classifications, nomenclature, basic grades, seasoning standards, description, measurement, tally, shipping provisions, grade marking, tally cards, sizes, uniform workings, and inspection of lumber be established as follows:

1. To the extent to which differences in quality of timber, in conditions of manufacture, and in the uses to which the product is put, will, in practical application, permit the basic provisions for the grading of lumber shall be uniform.

I. LUMBER CLASSIFICATIONS.

2. For the purposes of simplification of sizes and grades, and of equalizing, among species used for similar general purposes, the grades of a similar name, **lumber** shall be classified by principal uses into (a) yard lumber, (b) structural material, (c) shop and factory lumber.

1. Use Classification.

3. Lumber is the product of the saw and planing mill not further manufactured than by sawing, resawing, and passing lengthwise through a standard planing machine, cross-cut to length and matched.

4. Lumber is classified as (a) yard lumber, (b) structural material, and (c) factory and shop lumber. Different grading rules may apply to each class of lumber.

(a) **Yard Lumber:** Lumber that is less than 5 inches in thickness and is intended for general building purposes. The grading of yard lumber is based upon the use of the entire piece.

(b) **Structural Material:** Lumber that is 5 inches or over in thickness and width. The grading of structural material is based upon the strength of the piece and the use of the entire piece. (See footnote.)

Note: Dimension (Planks and Joists) to be used where working stresses are required should be considered and graded as structural material. (See IV Structural Material, pp— to—).

(c) **Factory and Shop Lumber:** Lumber intended to be cut up for use in further manufacture. It is graded on the basis of the percentage of the area which will produce a limited number of cuttings of a specified or of a given minimum size and quality.

2. Size Classification.

Yard Lumber.

5. (a) **Strips:** Yard lumber less than 2 inches thick and under 8 inches wide.

(b) **Boards:** Yard lumber less than 2 inches thick, 8 inches or over in width.

(c) **Dimension:** All yard lumber except boards, strips, and timbers; that is, yard lumber 2 inches and under 5 inches thick, and of any width.

(1) **Planks:** Yard lumber 2 inches and under 4 inches thick and 8 inches and over wide.

(2) **Scantlings:** Yard lumber 2 inches and under 6 inches thick and under 8 inches wide.

(3) **Heavy Joists:** Yard lumber 4 inches thick and 8 inches or over wide.

Structural Material.

(d) **Timbers:** Lumber 5 inches or larger in least dimension.

3. Manufacturing Classification.

6. Manufactured lumber is classified as (a) rough, (b) surfaced, and (c) worked.

(a) **Rough Lumber:** Undressed as it comes from the saw.

(b) **Surfaced Lumber:** Lumber that is dressed by running through a planer. It may be surfaced on one side (S1S), two sides (S2S), one edge (S1E), two edges (S2E) or a combination of sides and edges (S1S1E), (S2S1E), or (S1S2E) or (S4S).

(c) **Worked Lumber:** Lumber which has been run through a matching machine, stick-er, or molder. Worked lumber may be (1) matched, (2) shiplapped, or (3) patterned.

(1) **Matched Lumber:** Lumber that is edge dressed and shaped to make a close tongue and groove joint at the edges or ends when laid edge to edge or end to end.

(2) **Shiplapped Lumber:** Lumber that is edge dressed to make a close rabbetted or lapped joint.

(3) **Patterned Lumber:** Worked lumber that is shaped to a patterned or molded form.

II. NOMENCLATURE OF COMMERCIAL SOFTWOODS.

7. The standard commercial names for lumber cut from the principal species of softwoods, as shown in Appendix A on page 491, shall be used in the formulation of lumber grading rules and in the construction of contracts and the terms of purchase and sale of American standard lumber.

III. YARD LUMBER.

8. The term "yard lumber" as here used means lumber that is manufactured and classified into those sizes, shapes, and qualities required for ordinary construction and general purpose uses. (Heavy material for structural purposes, softwood factory and shop lumber, hardwood factory lumber, and other special-use materials are not considered yard stock.)

1. Grade Standards.

9. On the basis of quality yard lumber is divided into two main divisions: (a) Select lumber and (b) Common lumber. These are again divided into two classes: Select lumber into (1) that suitable for natural finishes and (2) that suitable for paint finishes. Common lumber into (1) that which can be used without waste and (2) that which permits some waste. Each of these four classes is further divided into quality classes or grades.

Select Lumber.

10. Lumber which is generally clear, containing defects limited both as to size and number, and which is smoothly finished and suitable for use as a whole for finishing purposes or other uses in which large, clear pieces are required, shall be considered as select lumber.

11. Two classes shall be recognized. The first shall be suitable for natural finishes. The second class permits similar defects, and in addition, blemishes of somewhat greater extent than those of the first class, but of a type which can be covered by paint.

Grade names: A, B, C, and D.

Common Lumber.

12. Lumber containing numerous defects and blemishes which preclude it from use for finishing purposes, but which is suitable

EDWARD HINES LUMBER CO.

Main Yard
Office
2431 S. Lincoln St.

Telephone
Canal
0349

Everything in Lumber



Bird's-eye view taken from tower 200 ft. high showing our three large yards, covering over 45 acres, and a water frontage of over one mile. The piling just opposite locomotive (over 1,000 in lumber) are 60 ft. long and appear like a bundle of matches. This gives you a comparative idea of the enormous size of our plant.

Honest Count — Uniform Quality
Quick Deliveries

Telephone our branch yard nearest your home

LARGEST LUMBER YARD IN THE WORLD

*Members of the Chicago Retail Lumber Dealers Association
Assuring Honesty and a Square Deal*

for general utility and construction purposes, shall be considered **common lumber**.

13. Two general classes shall be recognized. The first shall be suitable for use as a whole for purposes in which surface covering or strength is required. Defects and blemishes permitted in this class must be sound. The second class permits very

coarse defects which may cause waste in the use of the piece.

Grade names: No. 1 Common, No. 2 Common, No. 3 Common, No. 4 Common, and No. 5 Common.

Dimension grade names: No. 1 Common, No. 2 Common, and No. 3 Common.

14. **Basic Grade Classification for Yard Lumber.**

Total products of a typical log arranged in series according to quality as determined by appearance.	SELECT.	Lumber of good appearance and finishing qualities.	Suitable for natural finishes.	Grade A—Practically free from defects.
	COMMON.	Lumber containing defects or blemishes which detract from a finish appearance but which is suitable for general utility and construction purposes.	Suitable for paint finishes.	Grade B—Allows a few small defects or blemishes.
				Grade C—Allows a limited number of small defects or blemishes that can be covered with paint.
				Grade D—Allows any number of defects or blemishes which do not detract from a finish appearance, especially when painted.
				No. 1 Common—Sound and tight knotted stock. Size of defects and blemishes limited. May be considered water-tight lumber.
				No. 2 Common—Allows large and coarse defects. May be considered grain-tight lumber.
				No. 3 Common—Allows larger and coarser defects than No. 2 and occasional knot holes.
				No. 4 Common—Low quality lumber admitting the coarsest defects such as decay and holes.
				No. 5 Common—Must hold together under ordinary handling.

Definitions of Defects and Blemishes.

15. The defects and blemishes, enumerated in the rules for grading yard lumber of any species under the American Lumber Standards, shall be defined within the limits of the "Definitions of Maximum Defects and Blemishes" as shown on page 491, Appendix B.

General Provisions.

16. The grading of lumber cannot be considered an exact science, because it is based on a visual inspection of each piece and on the judgment of the grader. The provisions of these specifications, however, are sufficiently explicit to establish 5 per cent below grade as a reasonable variation between graders.

All yard lumber is graded with reference to its suitability for general use as yard lumber. With this in view, each piece is considered and its grade determined by its general character, including the location and sum of all of its defects and blemishes. Material not conforming to standard sizes or grades shown herein and that intended for special uses shall be covered by special contract and inspection.

17. Except in dimension, the grade of yard lumber, rough or surfaced two sides, shall be determined from the better or face side of the piece, and lumber which is surfaced one side only shall be graded from the surfaced side.

18. The rules for yard lumber prescribe the number and extent of defects and blemishes permitted in the poorest pieces admissible in each grade. A grade should be representative, however, and not made up of only low line pieces.

19. The number of defects and blemishes permitted varies as the area of the piece to be graded increases or diminishes in respect to the basic size or area specified, but the size of the defects must not exceed that allowed by the grading rules.

20. When defects or blemishes, or combinations thereof, not described in these grading rules are encountered, they will be considered as equivalent to known defects according to their damaging effect upon the piece in the grade under consideration.

Equivalent means equal, and in construing and applying these rules, the defects and blemishes allowed, whether specified or not, are understood to be equivalent in damaging effect to those mentioned applying to the stock under consideration.

Imperfections in rough stock which can be removed in dressing to standard size shall not be considered in determining the grade under these rules.

Defects and blemishes admissible in rough stock shall be the same as those applying to dressed stock of like kind and grade, and in addition, such other defects and blemishes as will disappear in dressing such stock to standard sizes shall be allowed.

21. Material shall be considered edge grain (vertical grain) when the rings (so-called grain) form an angle of 45° or more with the surface of the piece. When the angle becomes less than 45° at any point, the material shall be known as flat (slash) grain.

22. Mixed grades other than the two highest recognized grades for each species, not specifying the proportion of each grade, are not American Standard grades.

Lumber Seasoning.

Specifications dealing with lumber seasoning and moisture content shall be developed by each regional manufacturers association in accordance with its own conditions and the requirements of the users of its products. Such specifications adopted from time to time by any regional association shall be filed with the Central Committee on Lumber Standards for approval.

2. YARD AND INDUSTRIAL SIZE STANDARDS.

Basis of Measurement of Sizes.

The dressed dimensions, specified in paragraph 23 to 27 inclusive, and the rough sizes specified in paragraphs 23 to 30, inclusive, shall apply to lumber in the condition of seasoning as sold and shipped.

Dressed Sizes.

23. The terms "standard yard board" and "standard industrial board," and "standard yard dimension" and "standard industrial dimension" shall be the designations for 1-inch boards and 2-inch dimension, respectively.

24. 25/32 inch, S1S or S2S shall be the thickness for the standard yard board; 26/32 inch, S1S or S2S, for the standard industrial board.

25. 1½ inches, S1S or S2S shall be the thickness for standard yard dimension not more than 12 inches wide; 1¾ inches, S1S or S2S, for standard industrial dimension.

26. The finished widths of finish S1E or S2E shall be ¾ inch off on lumber of standard width of 3 inches; the finished widths of finish S1E or S2E (based on kiln dried lumber) shall be ½ inch off on lumber of standard widths of 4 to 7 inches, inclusive, and ¼ inch off on lumber of standard widths of 8 to 12 inches inclusive; and the finished widths of boards



This is one unit of a fleet delivering Quality Lumber and Millwork—for every purpose—to all parts of Chicago and Suburbs.

We also furnish Oak and Maple Strip Flooring, Cellized Wood Flooring Blocks, Cellized Plank Flooring, Blanket and Board Insulation, Building Papers, Plasterboard, Roofing, Sisalkraft, Tileboard, Wallboard and Asphalt Shingles—in fact, everything that is applied by carpenters. We render a complete service.

We carry a large and complete stock of all standard sizes and grades in both our Southside and Northside yards which enables us to make quick deliveries.

If you have any problems involving the use of any of the above items, we will be pleased to give you the benefit of our many years' experience and you may have access through us to the service of the Research Department of the Chicago Lumber Institute.



RITTENHOUSE & EMBREE CO.

3500 South Racine Avenue

Yards 0500

3358 Belmont Avenue

Juniper 0500

and dimension S1E or S2E shall be $\frac{3}{4}$ inch off on lumber of standard widths less than 8 inches and $\frac{1}{2}$ inch off on lumber of standard widths of 8 to 12 inches.

27. The thicknesses and widths of finished lumber, S1S or S2S, and/or S1E or S2E, shall be as follows:

Tables of sizes, methods of lumber measurement, shipping and other provisions included in the recommendations of December, 1923, and amended May 1, 1925, April 27, 1926, May 3, 1928, and December 7, 1928, are published under miscellaneous information in the back of this book.

Rough Dry Sizes.

28. The standard rough dry thickness of the standard yard board shall be not less than $\frac{3}{32}$ inch with an allowance of 20 per cent of the shipment, which may be not less than $\frac{28}{32}$ inch, and the standard rough dry thickness of the standard industrial board shall be not less than $\frac{30}{32}$ inch with an allowance of 10 per cent of the shipment, which may be not less than $\frac{33}{32}$ inch.

29. The standard rough dry thickness of finish, common boards, and dimension of standard sizes $1\frac{1}{4}$ inches and thicker, board measure, shall be not less than $\frac{1}{4}$ inch thicker than the corresponding standard finished dry thickness, with an allowance of 20 per cent of the shipment, which may be not less than $\frac{3}{8}$ inch thicker than the corresponding standard finished dry thickness.

30. The standard rough dry width of finish of 3 inch width, board measure, shall be not more than $\frac{1}{4}$ inch less than the nominal width; the standard rough kiln dried widths of finish of widths 4 to 7 inches, inclusive, board measure, shall be not more than $\frac{3}{4}$ inch less than the nominal widths, and widths 8 to 12 inches, inclusive, board measure shall be not more than $\frac{1}{2}$ inch less than the nominal widths; and the standard rough dry widths of common boards and dimension, 7 inches and narrower, board measure, shall be not more than $\frac{1}{4}$ inch less than the nominal widths, and the widths 8 to 12 inches, board measure, shall be not more than $\frac{1}{2}$ inch less than the nominal widths.

Lengths.

31. With the exception of the following enumerated odd lengths, which shall be standard, odd lengths in yard lumber and in structural material shall not be considered in the American Lumber Standards.

2 by 4 inches, 6 and 8 inches—9 and 11 feet.

2 by 8 inches and 10 inches—13 feet.

2 by 10 inches—15 feet.

8 by 8 inches, 10 by 10 inches, 10 by 12 inches, 12 by 12 inches, 14 by 14 inches, 16 by 16 inches, 18 by 18 inches—11 and 13 feet.

6 by 16 inches, 6 by 18 inches, 8 by 16 inches, 8 by 18 inches—15 and 17 feet.

32. The marketing practice covering lengths of yard lumber shall permit the buyer to secure specified lengths and/or specified assortments of lengths.

WORKINGS.

The standard workings of flooring, ceiling, partition, drop siding, and rustic, surfaced two sides and center matched, shiplap, heavy flooring, grooved for splines, and Byrkit Lath, as shown in Appendix C of Simplified Practice Recommendation No. 16, U. S. Department of Commerce, 4th Edition, shall be considered **standard**. All other workings shall be considered **special**.

MOLDINGS

The "standard designs and universal sizes" of wood moldings, as shown in Appendix D of Simplified Practice Recommendation No. 16, U. S. Department of Commerce, 4th Edition, shall be considered **standard**. All other designs and sizes shall be considered **special**.

APPENDIX A

STANDARD COMMERCIAL NAMES FOR LUMBER CUT FROM THE PRINCIPAL SPECIES OF SOFTWOODS.

The following Standard Commercial Names for lumber cut from the principal species of softwoods shall be used in the construction of contracts and other documents arising in transactions of purchase and sale of American Standard lumber. Preferred commercial names are shown in **bold face type**.

Standard Commercial Name Botanical Name
Cedars and Junipers

Alaska Cedar *Chamaecyparis nootkensis*

Eastern Red Cedar... *Juniperus virginiana*
Juniperus lucayana
(southern red cedar)
Juniperus mexicana
(mountain juniper)

Incense Cedar *Libocedrus decurrens*

Northern White Cedar *Thuja occidentalis*

Port Orford Cedar... *Chamaecyparis lawsoniana*

Southern White Cedar *Chamaecyparis thyoides*

Western Red Cedar... *Thuja plicata*

Western Juniper ... *Juniperus utahensis*
(Utah juniper)
Juniperus pachyphloea
(alligator juniper)
Juniperus scopulorum
(Rocky Mt. red cedar)
Juniperus occidentalis
(western juniper)

Cypress

Red Cypress (Coast type) *Taxodium distichum*

Yellow Cypress (Inland type) *Taxodium distichum*

White Cypress (Inland type) *Taxodium distichum*

Douglas Fir

Douglas Fir (Coast type) *Pseudotsuga taxifolia*.

Red Fir (Intermountain type) *Pseudotsuga taxifolia*.

Red Fir (Rocky Mountain type) *Pseudotsuga taxifolia*.

The True Firs

Alpine Fir *Abies lasiocarpa*

Balsam Fir *Abies balsamea* and
Abies fraseri (southern balsam fir)

Golden Fir *Abies magnifica*

Noble Fir *Abies nobilis*

Silver Fir *Abies amabilis*

White Fir *Abies concolor* and
Abies grandis (lowland white fir)

Hemlocks

Eastern Hemlock *Tsuga canadensis*

Tsuga caroliniana
(Carolina hemlock)

Mountain Hemlock .. *Tsuga mertensiana*

West Coast Hemlock .. *Tsuga heterophylla*

Larch

(See also **Tamarack**)

Western Larch *Larix occidentalis*

Pines

Arkansas Soft Pine.. *Pinus echinata* and
taeda

Idaho White Pine... *Pinus monticola*

Jack Pine *Pinus banksiana*

Loblolly Pine *Pinus taeda*

Lodgepole Pine *Pinus contorta*

Longleaf Pine *Pinus palustris*

North Carolina Pine.. *Pinus taeda* and *echinata*, and *Pinus virginiana* (Virginia pine)

Northern White Pine.. *Pinus strobus*

Norway Pine *Pinus resinosa*

Pond Pine *Pinus rigida serotina*

Pondosa Pine *Pinus ponderosa*

California White Pine *Pinus ponderosa* and
Pinus jeffreyi (Jeffrey pine)



One of many Special Rooms, Continental Illinois Bank

Fine Interior Wood Work

Cabinet Work
Bank Fixtures

EDMUNDS MANUFACTURING CO.

2016 Washburn Avenue
CHICAGO, ILL.

Shortleaf Pine	<i>Pinus echinata</i>
Slash Pine	<i>Pinus caribaea</i>
Southern Pine	<i>Pinus taeda</i> , <i>palustris</i> , serotina, <i>echinata</i> , and <i>caribaea</i> , and <i>Pinus rigida</i> (pitch pine), and <i>Pinus</i> <i>glabra</i> (spruce pine)
Sugar Pine	<i>Pinus lambertiana</i>
Redwood	
	<i>Sequoia sempervirens</i>
Spruces	
Eastern Spruce	<i>Picea mariana</i> (black spruce), <i>Picea rubra</i> (red spruce), and <i>Picea glauca</i> (white spruce)
Engelmann Spruce ..	<i>Picea engelmanni</i> and <i>Picea parryana</i> (blue spruce)
Sitka Spruce	<i>Picea sitchensis</i>
Tamarack	
Tamarack	<i>Larix laricina</i>
Yew	
Pacific Yew	<i>Taxus brevifolia</i>

APPENDIX B

DEFINITIONS OF MAXIMUM DEFECTS AND BLEMISHES

1. A **defect** is defined as any irregularity occurring in or on wood that may lower some of its strength, durability, or utility values.

2. A **blemish** is defined as anything, not classified as a defect, marring the appearance of the wood.

The commonly recognized defects and blemishes occurring in yard lumber are (names of species manufactured)

Bark pockets.	Pitch.
Bird's-eye.	Pitch pockets.
Checks.	Pitch seams.
Cross-breaks.	Pitch streaks.
Cross-grain.	Pith.
Decay.	Pith flecks.
Gum spots or streaks.	Shake.
Holes.	Splits.
Imperfect manufacture.	Stain or discoloration.
Knots.	Wane.
	Warp.

Bark Pockets.

3. A **bark pocket** is a patch of bark partially or wholly enclosed in the wood. In size it is classified the same as pitch pockets.

Bird's-eye.

4. "Bird's-eye" is a small central spot with the wood fibres arranged around it in the form of an ellipse, so as to give the appearance of an eye. "Bird's-eye," unless unsound or hollow, shall not be considered a defect.

Checks.

5. A **check** is a lengthwise separation of the wood, which occurs usually across the rings of annual growth.

6. A **surface check** is a check occurring on the surface of the piece.

7. A **small surface check** is a perceptible opening not over 4 inches long.

8. A **medium surface check** is one not over $\frac{3}{4}$ inch wide and over 4 but not more than 10 inches long.

9. A **large surface check** is one over $\frac{3}{4}$ inch wide and over 10 inches long.

10. An **end check** is one occurring on an end of a piece.

11. A **through check** is one extending from one surface through the piece to the opposite surface or to an adjoining surface.

12. A **heart check** is one starting at the pith and extending toward but not to the surface of a piece.

Cross Breaks.

13. A **cross break** is a separation of the wood cells across the grain, such as may be due to tension resulting from unequal shrinkage or mechanical stresses.

Cross Grain.

14. **Cross grained** wood is that in which the cells or fibres do not run parallel with the axis, or sides, of a piece.

15. **Slight cross grain** is a slope of the grain not over 1 inch in a length of 15 inches.

16. **Medium cross grain** is a slope of the grain over 1 inch in a length of 15 inches but not more than 1 inch in a length of 10 inches.

17. **Steep cross grain** is a slope of the grain over 1 inch in a length of 10 inches.

Decay.

18. **Decay** is a disintegration of the wood substance due to the action of wood-destroying fungi. The words *dote* and *rot* mean the same as decay.

19. **Incipient decay** is the early stage of decay in which the disintegration has not proceeded far enough to soften or otherwise change the hardness of the wood perceptibly. It is usually accompanied by a slight discoloration or bleaching of the wood.

20. **Firm red heart** is a stage of incipient decay characterized by a reddish color produced in the heartwood, which does not unfit the wood for the majority of yard purposes.

21. **Water-soak (or stain)** is a term applied to a generally water-soaked area in heartwood, which is usually interpreted as the incipient stage of certain wood rots.

22. **Advanced (or typical) decay** is the older stage of decay in which the disintegration is readily recognized because the wood has become punky, soft and spongy, stringy, ring-shaked, pitted, or crumbly. Decided discoloration or bleaching of the rotted wood is often apparent.

23. A **pocket rot** is typical decay which appears in the form of a hole, pocket, or area of soft rot, usually surrounded by apparently sound wood.

Gum Spots and Streaks.

24. A **gum spot or streak** is an accumulation of gum-like substance occurring as a small patch or streak in a piece. It may occur in conjunction with a bird peck, or other injury to the growing wood. In size they are classified the same as pitch pockets or pitch streaks.

Holes.

25. **Holes** in wood may extend partially or entirely through the piece and be from any cause.

26. When **holes** are permitted, the average of the maximum and minimum diameters measured at right angles to the direction of the hole shall be used in measuring the size, unless otherwise stated.

27. A **pin worm hole** is one not over $\frac{1}{8}$ inch in diameter.

28. A **medium worm hole** is one over $\frac{1}{8}$ inch but not more than $\frac{1}{4}$ inch in diameter.

29. A **large worm hole** is one over $\frac{1}{4}$ inch in diameter.

Imperfect Manufacture.

30. **Imperfect manufacture** includes all defects or blemishes which are produced in manufacturing, such as chipped grain, loosened grain, raised grain, torn grain, skips in dressing, hit and miss, variation in sawing, miscut lumber, machine burn, machine gouge, mismatching, and insufficient tongue or groove.

31. **Chipped grain** means that a part of the surface is chipped or broken out in very short particles below the line of cut. It should not be classed as torn grain and, as usually found, shall not be considered a de-



Stevens Hotel, Chicago, Ill.

Holabird & Root, Architects

Geo. A. Fuller Co., Contractors

MATTHEWS BROS. MFG. CO.



Chicago
Milwaukee, Wis.
New York

fect, unless it is present in excess of 25 per cent of the area.

32. **Loosened grain** means that a small portion of the wood has become loosened but not displaced.

33. **Raised grain** is a roughened condition of the surface of dressed lumber in which the hard summerwood is raised above the softer springwood, but not torn loose from it.

34. **Torn grain** means that a part of the wood is torn out in dressing, and in depth is of four distinct characters; slight, medium, heavy, and deep.

35. **Slight torn grain** is not over $\frac{1}{8}$ inch in depth.

36. **Medium torn grain** is over $\frac{1}{8}$ but not more than $\frac{1}{4}$ inch in depth.

37. **Heavy torn grain** is over $\frac{1}{4}$ but not more than $\frac{1}{2}$ inch in depth.

38. **Deep torn grain** is over $\frac{1}{2}$ inch in depth.

39. A **skip** is an area on a piece that failed to surface.

40. A **slight skip** is one that failed to surface smoothly, whose area does not exceed the product of the width of the piece in inches multiplied by 6.

41. A **heavy skip** is one that the planer knife did not touch.

42. **Hit and miss** is a series of skipped spots with surfaced areas between, or with skips the entire length when not over $\frac{1}{8}$ inch in depth.

43. **Variation in sawing** is a deviation from the line of cut. Slight variation is not more than $\frac{1}{16}$ inch in one-inch material, $\frac{1}{8}$ inch in 2-inch, $\frac{3}{16}$ inch in 3 to 7-inch, and $\frac{1}{4}$ inch in 8 inches and up.

44. **Miscut lumber** is that which has a greater variation in thickness or width at different places on the piece than specified for variation in sawing.

45. A **machine burn** is a darkening or charring of the wood due to overheating by the machine knives.

46. A **machine gouge** is a groove across a piece due to the machine cutting below the desired line of cut.

47. **Mismatched material** is worked material that does not fit tightly at all points of contact between adjoining pieces, or in which the surfaces of adjoining pieces are not in the same plane.

48. **Slight mismatch** is a surface variation not over $\frac{1}{64}$ inch.

49. **Medium mismatch** is a surface variation over $\frac{1}{64}$ but not more than $\frac{1}{32}$ inch.

50. **Heavy mismatch** is a surface variation over $\frac{1}{32}$ inch.

Knots.

51. A **knot** is a branch or limb embedded in the tree which has been cut through in the process of lumber manufacture. Knots are classified according to size, form, quality, and occurrence.

52. The average of the maximum and minimum diameters shall be used in measuring the size of knots, unless otherwise stated.

Size.

53. A **pin knot** is one not over $\frac{1}{2}$ inch in diameter.

54. A **small knot** is one over $\frac{1}{2}$ inch but not more than $\frac{3}{4}$ inch in diameter.

55. A **medium knot** is one over $\frac{3}{4}$ inch but not more than $1\frac{1}{2}$ inches in diameter.

56. A **large knot** is one over $1\frac{1}{2}$ inches in diameter.

Form.

57. A **round knot** is one oval or circular in form.

58. A **spike knot** is a branch or limb sawed in a lengthwise direction.

Quality.

59. A **sound knot** is solid across its face, as hard as the surrounding wood, and shows

no indications of decay. It may vary in color from red to black.

60. An **unsound knot** is solid across its face, but contains incipient decay.

61. A **decayed knot** is softer than the surrounding wood and contains advanced decay.

62. A **tight knot** is one so fixed by growth or position that it will firmly retain its place in the piece.

63. An **intergrown knot** is one whose rings of annual growth are completely intergrown with those of the surrounding wood.

64. A **watertight knot** is one whose rings of annual growth are completely intergrown with those of the surrounding wood on one surface of the piece, and which is sound on that surface.

(Note: Definitions for sound, tight, intergrown, or watertight knots may be combined in one or more definitions.)

65. An **encased knot** is one whose rings of annual growth are not intergrown and homogeneous with those of the surrounding wood. The encasement may be partial or complete; or pitch or bark.

66. A **"not firm" knot** is one which under ordinary conditions will hold its place in a dry board and yet under pressure can be started but not easily pushed out of the piece.

67. A **loose knot** is one not held firmly in place by growth or position and cannot be relied upon to remain in place in the board.

68. A **pith knot** is a sound knot with a pith hole not more than $\frac{1}{4}$ inch in diameter.

69. A **hollow knot** is an apparently sound knot with a relatively large hole in it.

Occurrence

70. A **single knot** is one occurring by itself with the fibers of the wood in which it occurs deflected around it.

71. A **knot cluster** is two or more knots grouped together as a unit with the fibres of the wood deflected around the entire unit. A group of single knots is not a knot cluster.

72. **Branch knots** are two or more knots branching from a common center.

Pitch.

73. **Pitch** is a poorly defined accumulation of resin in the wood cells in a more or less irregular patch.

74. **Light pitch** is the lightly evident presence of pitch.

75. **Medium pitch** is a slightly more evident trace of pitch than is the light.

76. **Heavy pitch** is the very evident presence of pitch showing by its color and consistency.

77. **Massed pitch** is a clearly defined accumulation of solid pitch in a body by itself in a piece of lumber.

Pitch Pockets.

78. A **pitch pocket** is a well defined opening between rings of annual growth usually containing, or which has contained, more or less pitch, either solid or liquid. Bark also may be present in the pocket.

79. A **very small pitch pocket** is one not over $\frac{1}{8}$ inch in width and not over 2 inches in length.

80. A **small pitch pocket** is one not over $\frac{1}{8}$ inch in width and not over 4 inches in length, or not over $\frac{1}{4}$ inch in width and not over 2 inches in length.

81. A **medium pitch pocket** is one not over $\frac{1}{8}$ inch in width and not over 8 inches in length, or not over $\frac{3}{8}$ inch in width and not over 4 inches in length.

82. A **large pitch pocket** is one whose width or length exceeds the maximum stated as permissible for a medium pitch pocket.

83. A **closed pitch pocket** is one that does not show an opening on both sides of the piece.



WEST WOODWORKING COMPANY

Fine Interior Woodwork and Fixtures
for

BUILDINGS, BANKS AND STORES

ESTABLISHED 1880

300-324 North Ada Street

CHICAGO, ILLINOIS

Pitch Seams.

84. A **pitch seam** is a shake or check which is filled with pitch.

Pitch Streaks

85. A **pitch streak** is a well-defined accumulation of pitch in a more or less regular streak.

86. A **small pitch streak** is one not over $\frac{1}{12}$ the width by $\frac{1}{6}$ the length of the surface on which it occurs.

87. A **medium pitch streak** is one over $\frac{1}{12}$ but not more than $\frac{1}{6}$ the width, by over $\frac{1}{6}$ but not more than $\frac{1}{3}$ the length of the surface on which it occurs.

88. A **large pitch streak** is over $\frac{1}{6}$ the width by $\frac{1}{3}$ the length of the surface on which it occurs.

Pith.

89. **Pith** is the small soft core occurring in the structural center of a log. The wood immediately surrounding the pith often contains small checks, shake, or numerous pin knots, and is discolored; any such combination of defects and blemishes is known as **heart center**.

Pith Flecks.

90. A **pith fleck** is a narrow streak resembling pith, usually brownish, up to several inches in length on the surface of a piece resulting from burrowing of larvae in the growing tissue of the tree.

Shake.

91. A **shake** is a lengthwise separation of the wood, which occurs usually between and parallel to the rings of annual growth.

92. A **fine shake** is one with a barely perceptible opening.

93. A **slight shake** is one with more than a perceptible opening but not over $\frac{1}{32}$ inch in width.

94. A **medium shake** is one with an opening over $\frac{1}{32}$ but not more than $\frac{1}{8}$ inch wide.

95. An **open shake** is one with an opening over $\frac{1}{8}$ inch wide.

96. A **through shake** is one extending from one surface through the piece to the opposite surface or to an adjoining surface.

Splits.

97. A **split** is a lengthwise separation of the wood, due to the tearing apart of the wood cells.

98. A **short split** is one whose length does not exceed either the width of a piece or $\frac{1}{6}$ its length.

99. A **medium split** is one whose length exceeds the width of a piece, but does not exceed $\frac{1}{3}$ its length.

100. A **long split** is one whose length exceeds $\frac{1}{6}$ the length of a piece.

Stain (or Discoloration).

101. **Stain** is a discoloration, occurring on or in lumber, of any color other than the natural color of the piece on which it appears. It is classified as light, medium, and heavy.

102. **Light stain** is a slight difference in color which will not materially impair the appearance of the piece if given a natural finish.

103. **Medium stain** is a pronounced difference in color which, although it does not obscure the grain of the wood, would customarily be objectionable in a natural but not in a painted finish.

104. **Heavy stain** is a difference in color so pronounced as practically to obscure the grain of the wood.

Wane.

105. **Wane** is bark, or the lack of wood or bark, from any cause, on the edge or corner of a piece.

106. **Slight wane** is not over $\frac{1}{4}$ inch wide on the surface on which it appears, for $\frac{1}{6}$ the length and $\frac{1}{4}$ the thickness of the piece.

107. **Medium wane** is over $\frac{1}{4}$ inch but not more than $\frac{1}{2}$ inch wide on the surface

on which it appears, for $\frac{1}{6}$ the length and $\frac{1}{4}$ the thickness of the piece.

108. **Large wane** is over $\frac{1}{2}$ inch wide on the surface on which it appears, and/or over $\frac{1}{6}$ the length and $\frac{1}{4}$ the thickness of the piece.

Warp.

109. **Warp** is any variation from a true or plane surface. It includes bow, crook, cup, or any combination thereof.

110. **Bow** is a deviation flatwise from a straight line drawn from end to end of a piece and is measured at the point of greatest distance from the straight line.

111. **Crook** is a deviation edgewise from a straight line drawn from end to end of a piece and is measured at the point of greatest distance from the straight line. It is known as slight, small, medium, and large.

112. Based on a piece 4 inches wide and 16 feet long, the distances for the different degrees of crook shall be: for **slight crook**, a maximum of 1 inch; **small crook**, $1\frac{1}{2}$ inches; **medium crook**, 3 inches; and **large crook**, over 3 inches. For wider pieces it shall be $\frac{1}{2}$ inch less for each additional 2 inches of width. Shorter or longer pieces may have the same curvature.

113. **Cup** is a curve in a piece across the grain or width of a piece. It is measured at the point of greatest deviation from a straight line drawn from edge to edge of a piece. It is known as slight, medium, and deep.

114. Based on a piece 12 inches wide, the distances for the different degrees of cup shall be: for **slight cup**, a maximum of $\frac{1}{4}$ inch; **medium cup**, $\frac{3}{8}$ inch; and **deep cup**, $\frac{1}{2}$ inch. Narrower or wider pieces may have the same curvature.

RECOMMENDED ARCHITECT'S DETAILED DESCRIPTION OF GRADES SUPPLEMENTAL TO "SUMMARY OF BASIC GRADE CLASSIFICATIONS FOR YARD LUMBER."

(See Sec. 14.)

The standard grades of yard stock products, such as finish, flooring, siding, boards and dimension, conform to the following basic grading specifications, with such modifications as are required by the use intended or may be permitted in the interests of conservation. Grades other than these described shall be considered special. (These grades are based on a piece 8 inches wide by 12 feet long, or a piece which contains 8 square feet, surface measure.)

GRADE A shall be free from defects on the face side of pieces to and including 12 inches in width. Widths greater than 12 inches will admit two or combination of two of any of the following defects:

- Sound and tight pin knot.
- Small pitch pocket.
- Small surface check.
- Slight crook.
- Slight wane.

GRADE B shall possess natural finishing qualities but will admit two or combination of two of any of the following defects:

- Medium sound and intergrown knot.
- Two small knots.
- Three sound and tight pin knots.
- Short split.
- Five shakes; equal in length to width of piece.
- Three small surface checks.
- Medium wane.
- Small crook.
- Slight cup.
- Medium pitch pocket.
- Three very small pitch pockets.
- Small pitch streak.
- Pin worm holes, one per surface foot.
- Slight discoloration; 5 per cent of area.
- Firm red heart; 5 per cent of area.
- Patch slight torn grain.
- Slight chipped grain.

FOR thirty years we have specialized in the manufacture of high-grade Cabinet Work, Fixtures and Interior Trim.

During this period we have enjoyed the execution of many contracts for a large number of Banks, Stores, Hotels, Public Buildings, Residences, and Office Buildings.

Our Clients reach from coast to coast, and the lasting satisfaction of our work has been amply proven by their continued patronage.



A FEW OF OUR RECENT INSTALLATIONS

NAME	LOCATION	ARCHITECT
100 West Monroe Bldg.	Chicago, Ill.	Frank D. Chase, Inc.
1500 Lake Shore Drive Bldg.	Chicago, Ill.	McNally & Quinn
1325 Astor St. Bldg.	Chicago, Ill.	Rebori, Wentworth, Dewey & McCormick
Jackson City Bank	Jackson, Mich.	Weary & Alford Co.
Stop & Shop	Chicago, Ill.	Schmidt, Garden & Erikson
First National Bank	Wilmette, Ill.	Hamilton, Fellows & Nedved
Continental Illinois Bank & Trust Co.	Chicago, Ill.	Graham, Anderson, Probst & White
First National Bank Bldg.	Davenport, Iowa	Childs & Smith
Gary State Bank	Gary, Ind.	Ivar Viehe-Naess & Co.



Schick-Johnson Company

Established 1893

Main Office and Factory: 1737-45 N. PAULINA ST.

CHICAGO

Telephone Brunswick 6220-6221-6222

GRADE C shall possess finishing qualities but will admit any four or combination of four of any of the following defects:

- Medium sound and intergrown knot.
- Small encased knot.
- Three sound and tight pin knots.
- Short split.
- Fine shake; equal in length to width of piece.
- Three small surface checks.
- Medium wane.
- Small crook.
- Slight cup.
- Medium pitch pocket.
- Three very small pitch pockets.
- Medium pitch streak.
- Pin worm holes; 2 per surface foot.
- Medium discolorations: 10 per cent of area.
- Firm red heart; 10 per cent of area.
- Pith. 3 inches in length.
- Patch medium torn grain.
- Slight skip.

GRADE D shall be of select common quality and possess a finishing appearance but will admit any number of the following defects and blemishes. More serious defects shall be permitted on the reverse side, but no combination so serious as to prevent its use for the purpose intended.

- Medium sound and intergrown knot.
- Small encased knot.
- Short split.
- Fine shake.
- Medium surface check.
- Medium wane.
- Small crook.
- Slight cup.
- Medium pitch pocket.
- Medium pitch streak.
- Pin worm holes; 2 per surface foot.
- Medium discoloration: 10 per cent of area.
- Firm red heart; 10 per cent of area.
- Pith. 3 inches in length.
- Patch medium torn grain.
- Slight skip.

Pieces containing one serious defect, such as loose knot or knot hole located more than 32 inches from either end, but which may be cut out with a loss no greater than 3 inches in length, may be permitted, provided the rest of the piece is of B or better quality.

No. 1 Common shall present a generally smooth appearance and be high class general utility lumber. It permits any number of the following defects not in serious combination:

Sound and intergrown knots: 1½ inches in diameter in 4-inch and 6-inch widths, 2 inches in 8-inch and 10-inch, 2½ inches in 12-inch and not over 3 inches in wider widths.

Black and encased knots: one-half the diameter of sound and intergrown knots permitted up to a maximum diameter of 1¼ inches, provided the knot be sound and immovably fixed in position.

Short split.

Slight shake that does not go through; equal in length to width of piece.

Surface checks.

Medium wane.

Small crook.

Medium cup.

Large pitch pockets which do not show an opening through the piece.

Large pitch streak.

Pitch.

Pin worm holes not exceeding 12 per surface foot if well scattered.

Medium discoloration.

Firm red heart.

Pith one-sixth the length of piece.

Patch heavy torn grain.

Slight skip.

Medium cross grain.

No. 2 Common permits any number of the following defects, but no combination of them so serious as to prevent the use of each piece as a whole, except as noted:

Sound and tight knots: 2½ inches in diameter in 4 and 6-inch widths, 3 inches in 8 and 10-inch, 3½ inches in 12-inch, and not over 4 inches in wider widths.

Unsound and pith knots, provided the knot be fixed in position.

Spike or branch knots; which are sound and do not weaken the piece at any point more than the knots heretofore specified.

Splits not more than ¼ the length of the piece.

Through check or shake; ½ the length of the piece.

Large wane.

Medium crook.

Large cup.

Large through pitch pockets; which do not show an opening greater than ½ inch wide by 3 inches in length.

Large pitch streak.

Pitch.

Small grub worm holes; maximum of one per surface foot.

Pin worm holes.

Slight peck.

Heavy discoloration.

Firm red heart.

Streak of advanced decay, not going through the board, equal in area to a streak ½ inch wide by 1/6 the length of piece.

Pith.

Deep torn grain.

Slight skips.

Large cross grain.

Pieces containing a loose knot or a knot hole not more than 2 inches in diameter may be permitted, provided the rest of the piece is of No. 1 Common quality.

No. 3 Common permits all defects and blemishes allowed in No. 2 Common but to a greater degree. It shall be suitable for use as a whole.

No. 4 Common. The defects common to this grade are much the same as those found in No. 3, but exist to a greater degree. The most common serious defects are knot holes, either red rot or its equivalent, in heavy massed pitch, or serious check. Other types are extremely coarse knotted, wane, excessive heart shake, badly split or badly checked pieces.

No. 5 Common is the lowest recognized grade and admits all defects known in lumber, provided the piece is strong enough to hold together when carefully handled.

SIMPLIFIED PRACTICE RECOMMENDATION.

7. SHINGLES.

Grades.

55. The basic grades of shingles shall be A, B, C, and D. The grade name shall be clearly marked on each and every bundle of wood shingles.

Sizes.

56. 16-inch 6/2 shingles and 18-inch 5/2 shingles shall be eliminated.

57. Dimension shingles shall be sold full net count, no dimension shingle to be less than ¾ inch scant of the specified width when dried.

Shipping Provisions.

58. The kiln-dried weight of shingles shall be not more than 10 per cent under the present association shipping weights.

59. The openings shall not exceed an average of 1 inch to the course in random-width shingles.

Specifications for Red Cedar Shingles.

Specifications for Standard Grades of Red Cedar shingles, 24"-4 2/2", 18"-5 2 1/4" and 16"-5 2/2", random width are as follows:

A—Strictly clear, edge grain, and free from sap.

B—Strictly clear, not less than 50% edge grain, not more than ½" sap, within 5" from butt, on one edge only.

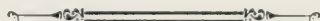
C—10-inch clear butts and better for 16 and 18" shingles, and 16-inch clear butts and better for 24-inch shingles. Sap permitted.

D—6-inch clear butts for 16 and 18" shingles, 10-inch clear butts for 24-inch shingles. Sap permitted.

JOSEPH KASZAB

Manufacturer

*Architectural Wood Work
Bank-Store-Office Fixtures
High Grade Interior Finish*



Phone Canal 6754

**1436-1444 West 21st Street
CHICAGO**



Installations

BUILDINGS

Foreman National Bank
Carbide & Carbon Bldg.
Bismarck Hotel.
Metropolitan Bldg.
Builders Bldg.
Adams & Franklin Bldg.
Finchley Bldg.
Illinois Woman's Athletic Club
Carson, Pirie, Scott & Co.
Lebolt & Company
I. Miller & Sons
Foot Saver Shoe Shop

ARCHITECTS

Graham, Anderson, Probst & White
Burnham Bros., Inc.
C. W. & Geo. L. Rapp
C. W. & Geo. L. Rapp
Graham, Anderson, Probst & White
Alfred S. Alschuler
Alfred S. Alschuler
Schmidt, Garden & Erickson
Burnham Bros., Inc.
Graham, Anderson, Probst & White
Louis Friedland, N. Y.
S. S. Silver, N. Y.

HISTORIC.

This is not a part of "American Lumber Standards."

Structural Grades of Lumber and Timber and the Method of Their Development.

H1. The purpose of structural grades is to offer means for selecting structural material for strength, and for uniformity in strength, in order that appropriate working stresses may be assigned.

H2. The most important factors which influence the strength of structural material are the size, number and location of defects, and the extent of exposure to moisture during use. These factors must all be considered in design or grading if the maximum utilization is to be obtained from the material used.

H3. Structural grades control defects by limiting their size and location in accordance with their effect upon strength. Working stresses for each species are recommended by the Forest Products Laboratory, U. S. Forest Service, and take into consideration the allowable defects, the moisture content as determined by conditions of use, and, in the case of southern pine and Douglas fir, rate of growth and percentage of summer-wood.

H4. Moisture affects the strength of structural timbers both directly and indirectly. The direct effect of loss of moisture is the stiffening and strengthening of the wood fibers. This increase in strength, however, is accompanied by checking, splitting, warping and twisting; as a consequence, some of the strength due to drying is lost. Timbers are also subject, during use, to varying conditions of moisture, from the dry location of a heated building, to the continually wet condition of some pier and dock timbers. All of these conditions are taken into account in recommending working stresses under different conditions of use.

H5. In dimension four inches and less in thickness the development of defects during seasoning does not offset the increase in strength from drying as much as in larger sizes, and in these sizes used in dry locations, higher working stresses in extreme fiber in bending can be recommended than in pieces of larger size having proportionately equivalent defects.

H6. The principal defects which must be limited in structural grades are: Knots, Shakes and Checks, and Slope of Grain.

H7. The influence of a knot in a beam is determined by its location, and the area of its projection on the cross section of the piece, the method of measurement being such as to give the best approximation of this influence. Knots in posts and large beams are likely to show only on one face or to run diagonally through the piece, and reduce the strength in practically direct proportion to their size as measured. In dimension sizes, such as joist, the knot is likely to run directly through the piece, and the strength is measured by the square of the effective depth, assuming the knot in its worst position, near the edge of the piece, and the reduction in strength due to the knot is approximately twice the ratio of the size of the knot to the width of the face. In similar material used flat, as plank, the influence of a knot is directly proportional to the size, as on the top and bottom edges of beams.

H8. Knot limitations on edges of wide faces of dimension sizes, for use as joist, are more severe than would be required for use flat, as plank, the sizes applying along the center lines of the wide faces as joist being those which could theoretically apply at any point across the width if used only as plank. It has been found, however, that under practically all conditions of use, knots along the edges of planks are more objectionable than knots along the center lines and this is recognized in some commercial yard grades of plank in a stricter limitation of knots

along the edges of wide faces than along the center lines. The same knot limitations are applied, therefore, to material to be used either as joist or plank, and the same working stresses are assigned for use either on edge or flat.

H9. In both joists and beams, knots reduce strength most along the top and bottom edges, through the center portion. The sizes of knots permitted in various portions of a joist or beam are limited in accordance with the stresses, and they are allowed to increase toward the ends and toward the center lines of the vertical faces, no knot, however, being permitted of more than double the size allowed at the point of maximum stress.

H10. There is greater proportional distortion of grain around a large knot than around a smaller one, and shrinkage in seasoning causes greater internal stresses, so knot sizes are increased proportionately to width of faces only up to 6-inch top and bottom faces of beams. 12-inch vertical faces of beams, and 12-inch faces of dimension and posts. Beyond these widths of face, increase is proportional to the square root of the ratio of the wider faces to these widths. The distribution and aggregate diameter of knots is limited, as well as the maximum size of the single knot. The aggregate diameter of all knots in the center half of the length on any face of a Beam or Stringer shall be limited, in direct proportion, to an aggregate diameter of twice the width of the face in a grade having 50 per cent of the strength of clear wood. In Joist and Plank, in dry locations, the aggregate diameter of knots in the center half of the length on any face may be greater by one-half the width of the face than the aggregate diameter permitted in Beams and Stringers. In Posts and Columns, the aggregate diameter of all knots in any 6 inches of length, in any grade, shall not exceed twice the size of the maximum knot allowable.

H11. In joist and plank, the mean or average diameter of a knot is taken as its size. In such thin and relatively wide material, whether used on edge or flat, this is a safe measure of the influence of knots on strength, and has the commercial advantage of being directly applicable to yard grades of lumber. This method of measurement will exclude damaging spike knots, and can be applied to them as well as to round or oval knots.

H12. On the top or bottom of a beam, the influence of knots is measured largely by the surface fibers cut. The projection of the knot on a line at a right angle to the edge is, therefore, used. On the vertical face of a beam, the depth to which a knot penetrates is of great importance, while the influence of the number of surface fibers cut, and the amount of grain distortion, is considerably less important than on the horizontal faces. The smallest diameter of the knot is, therefore, used.

H13. One of the best examples illustrating the reason for the smallest diameter being taken on the vertical face is the splitting of a boxed heart timber into two pieces. The long spike knots which might be opened up in this way would be no more injurious to the strength of the two pieces than they would as a single knot in a boxed heart piece, and the two pieces so cut would be less subject to seasoning checks than a boxed heart piece.

H14. In columns there are two factors: area of cross section occupied by a knot, which would probably be measured best by the small diameter of the knot, and the influence of bending stresses when the column begins to fail, probably measured best by the projection of the knot. In short columns, the area of the cross section is of primary importance; as the column gets longer, the factor of bending strength increases in importance until the condition of the Euler

B. R. Ringwald and Sons Co.



8082-92 SOUTH CHICAGO AVENUE

CHICAGO, ILL.

Established 1888

Phones South Shore 5932-5933

MANUFACTURERS



Frames, Sash, Doors and Mouldings Interior Cabinet Work

We make a specialty of

UNION MADE

KITCHEN CABINETS *and* UNITS COMPLETELY
EQUIPPED

Service - Quality - Square Dealing

Forty-one years of serving our trade in the Sash, Door and Interior-Finish business, specializing in Cabinet Work of the highest grade, has brought to us that experience which comes only to those whose efforts have succeeded in satisfying the most exacting customers and have in turn been rewarded in a consistent manner by repeated contracts large and small due to our service, quality and square dealing.

Our organization is pledged to continue on in the same efficient manner in rendering to you the highest class service possible, no matter what your requirements may be or how exacting.

Please phone or write us and without obligation on your part we will submit you an estimate on your requirements.

formula is reached, when stiffness, on which knots have practically no influence, becomes the ruling factor. The average diameter, therefore, is used as that which applies best to the average condition.

H15. In grades for structural uses no distinction is made between intergrown knots and encased knots or knotholes, observation at the Forest Products Laboratory in recent tests having shown that intergrown knots reduce strength fully as much as encased knots or knotholes.

H16. Shakes reduce the area of a beam acting in resistance to shear, and the limitations placed on shake are based on this reduction. Checks are limited on the same basis as shakes, and no combination of shakes and checks is permitted which would reduce strength to a greater extent than would the allowable size of either separately.

H17. Slope of grain, resulting either from diagonal sawing or from spiral or twisted grain in the log, is limited in accordance with the recommendations of the Forest Products Laboratory, based on the results of detailed study of the effect of cross and spiral grain on strength, and the weakening of material by checks which invariably develop and, without exception, follow the grain. There is not much reduction in strength from cross grain until an angle of 1 in 40 is reached. From that slope in a beam an angle of grain of 1 in 20 reduces strength about $\frac{1}{4}$; 1 in 15, about $\frac{1}{3}$; 1 in 11, $\frac{1}{2}$; and 1 in 8, $\frac{1}{2}$. In a post for column, an angle of 1 in 15 reduces strength about $\frac{1}{4}$; 1 in 11, about $\frac{1}{3}$; 1 in 8, $\frac{1}{2}$; and 1 in 6, $\frac{1}{2}$.

H18. Wane is limited by such considerations as bearing area, nailing edge, appearance, etc., rather than by effect on strength. The percentage reduction in strength resulting from wane toward the center of a beam is about double the percentage reduction in cross-sectional area. No combination of wane and knots is permitted which would reduce the strength more than the maximum allowable knot. The occurrence of maximum wane and maximum knot in the same cross section at the center of a beam would be so rare, however, and the effect of the allowable maximum wane is so small a percentage of the effect of the maximum allowable knot, that the additional reduction in strength beyond the effect of the knot would be slight and it is usually unnecessary to give attention to combination of wane and knot.

H19. Pitch pockets are ordinarily not defects in a structural grade. A large number, however, indicates a general lack of bond, and such a piece should be carefully inspected for shakes.

H20. Heartwood and sapwood have been found by the Forest Products Laboratory to be of equal strength, and no requirement of heartwood need be made when strength alone is the governing factor. Heart requirement, when durability of untreated material under exposure is a factor, as in bridges, trestles, docks and piers, or in damp buildings, or buildings in which conditions of high humidity prevail, may be specified in any grade, according to exposure and use. When preservative treatment is to be applied, there should be no restriction as to sapwood, as sapwood is easier to treat than heartwood and a large amount is to be preferred.

H21. The density of the wood substance of all species is practically the same. The dry weight is, therefore, a measure of the amount of wood substance present; and on the amount of wood substance present depends the strength of the clear wood. No pieces of exceptionally light weight are permitted in the Select grades, but light weight pieces otherwise of Select grade may be accepted in the Common grades.

H22. In southern pine and Douglas fir, the proportion of summerwood, the dark portion of the annual ring, furnishes a practical means of estimating density. Selection of

these species for density, to the extent that dense material is commercially available, assures material of the highest character from the standpoint of strength, and uniformity in strength, in the clear wood.

H23. Selection of these species for rate of growth is not as great an assurance of increased strength as selection for percentage of summerwood, but for many purposes selection for rate of growth will assure material of suitable type. Close grain, i. e., not less than six nor more than twenty annual rings per inch, is required in the Select Structural grades of those species.

H24. In acceptance for density the contrast in color between summerwood and springwood should be distinct. Absence of contrast occasionally occurs in bands of growth rings which appear on the whole darker in color than the adjacent material. The summerwood merges into the springwood abnormally with a gradual change of color, leaving practically no material which has the normal appearance of springwood. Such material has been called by a number of names, including proud wood, red wood, and compression wood. It has a decided end shrinkage, is weak in tension, and material of this character in even a small part of a cross section is undesirable in high-class structural timbers.

H25. Structural grades specify minimum requirements and maximum defects, all of which may be present at one time. When a particular piece which is being inspected, therefore, is slightly below the provisions of the grade in some respects but is of average density or above, the relative effect on the properties affected should be given consideration.

H26. In inspection for density, reasonable variation of opinion between inspectors should be recognized. A fair provision for reinspection of a particular lot of timbers for density would be that for every three timbers accepted as having one-third or more summerwood, one of the remaining timbers be accepted if having between 30 and 33 1/3 per cent summerwood.

H27. A large percentage of material in standard yard grades of Dimension and Timbers will meet the additional requirements of structural grades for Joist and Plank, and Posts and Timbers, and material to meet these requirements can easily be selected from local stocks: Select from Selected Common and Merchantable grades, and Common from No. 1 Common grades. Beams and Stringers vary materially in size and are not stocked extensively. These are essentially special order grades.

H28. As previously noted, the provisions of the Joist and Plank grades are such that material graded by them may be used on edge, as joists or rafters, or flat, as scaffold plank or factory flooring. Joist and Plank grades apply to material not thicker than four inches. Material thicker than four inches, for use in bending, should be graded by Beam and Stringer grades. In such material with loads applied to the wide face, the knot requirements for this face are those for the narrow face as given in the rules.

H29. Material to be used for such purposes as caps, bridge ties, etc., where strength in bending is a factor, should be specified in Beam and Stringer grades although of shape more commonly considered as of timber grades, as the method of measuring knots in Post and Timber grades makes it impracticable to assign bending stresses to them. Caps and bridge ties are often square, or have horizontal faces wider than the vertical faces, in contrast to beams and stringers in which the narrow faces are horizontal faces and the wide faces are vertical, and this should be noted in applying the knot provisions of the Beam and Stringer grades to such material.

Abolish Restrictions

THE ANDERSON & LIND MANUFACTURING COMPANY, Manufacturers of Millwork, were the Pioneers in opposing and fighting the vicious agreements between labor leaders, contractors, material manufacturers and dealers which placed restrictions on the use of building material and has a perpetual court injunction that restrains interference with its business and with the installation of its millwork. This injunction has been upheld by both the Appellate Court and the Illinois Supreme Court and is not affected or impaired in any way by the anti-injunction law passed by the Illinois Legislature.

The Carpenters District Council's Agreement with the Carpenter Contractors provides that there shall be no restrictions on the use of any manufactured material, except prison-made.

The Public can assist in this fight by refusing to patronize those firms who are still endeavoring to maintain restrictions on the use of building material by disseminating propaganda to the effect that materials must bear certain labels or they will not be installed.

This policy, if consistently adhered to, will abolish forever illegal restrictions on the use of building material.

THE ANDERSON & LIND MANUFACTURING COMPANY, has its Factory and General Office at 2127-45 Iowa Street, Chicago, Illinois. Phones Humboldt 0902-03-04-05.

IV. STRUCTURAL MATERIAL.

Basic Provisions for the Selection and Inspection of Softwood Dimension and Timbers Where Working Stresses Are Required.

The following provisions are for use as a basis for the preparation by lumber manufacturers of grading rules for structural material. It is understood that these basic provisions are not to be used as grading rules, but are merely a standardized working basis to enable manufacturers of the various species to coordinate their grades as far as possible.

1. BASIC GRADE AND USE CLASSIFICATIONS.

61. Basic Grades:

- (a) **Dense Select.**
Douglas Fir and Southern Pine.
- (b) **Select.**
Douglas Fir.
- (c) **Select.**
Other Softwood Species except Southern Pine.
- (d) **Dense Common.**
Douglas Fir and Southern Pine.
- (e) **Common.**
All Softwood Species.

62. Use Classifications:

- (a) **Joist and Plank.**
Joists, Rafters, Plank, Factory Flooring, etc.
- (b) **Beams and Stringers.**
Beams, Girders, Stringers, etc.
- (c) **Posts and Timbers.**
Posts, Caps, Sills, other Timbers, etc.

2. OPTIONAL PROVISIONS.

63. No heartwood requirements are provided in these grades. Heartwood when desired, for durability of untreated timber, should be specified in terms of heartwood required on the girth, or on each face, side, or edge. Girth shall be measured at the point where the greatest amount of sapwood occurs.

64. For material to be treated, a large amount of sapwood is to be preferred. It is not practicable to specify a minimum sapwood requirement, but it could be provided that there is no restriction on sapwood.

65. Wane is permissible in all grades, as far as strength properties are concerned, but square edges may be specified when appearance, bearing, or other factors of use require.

3. GENERAL PROVISIONS.

Sound Wood.

66. All grades shall contain only sound wood, free from any form of decay, incipient or advanced, including firm red heart, dote, and rot.

Definitions of Faces and Edges.

67. The faces of a piece of dimension or of a timber are the four longitudinal surfaces of the piece, sometimes further designated as "wide" faces or "narrow" faces.

68. In a piece of dimension or of a timber graded for use in bending, wide faces shall be taken as vertical faces, and narrow faces as horizontal faces, unless otherwise noted.

69. When the faces of a piece of dimension or of a timber are of equal width, Post and Timber grades shall be used unless otherwise noted. When such a piece of dimension or such a timber is graded for use in bending, the best faces shall be taken as the horizontal faces and should be so marked.

70. The edges of a piece of dimension or of a timber are understood to be the narrower faces, and the sides the wider faces. In describing the locations of knots and other defects in structural material, however, the edges of a given face are understood to be the inter-section of two adjacent faces, commonly called corners in the past.

Knots.

71. The size of a knot shall be measured on the section of the knot appearing on the face under consideration.

72. On narrow faces of joist and plank, and on narrow or horizontal faces of beams and

stringers, the size of a knot shall be taken as its width between lines parallel to the edges of the piece.

73. On wide or vertical faces of beams and stringers, the smallest diameter of a knot shall be taken as its size.

74. Knots at edges of wide or vertical faces of beams and stringers are limited to the same size as on adjacent narrow or horizontal faces, but the size is measured on the least diameter of the knot instead of on its width between lines parallel to the edges of the piece.

75. In posts and timbers, and on wide faces of joist and plank, the size of a knot shall be measured on the mean or average diameter. The mean or average diameter of a knot shall be taken as the average of the maximum and minimum diameters.

76. The size of knots on narrow faces and at edges of wide faces of joist and plank, and on narrow or horizontal faces and at edges of wide or vertical faces of beams and stringers, may increase proportionately from the size allowed in the middle third to twice that size at the ends of the piece.

77. The size of knots on wide faces of joist and plank, and on wide or vertical faces of beams and stringers, may increase proportionately from the size allowed at the edge to that allowed at the center line.

78. Cluster knots and knots in groups are not permitted.

79. Knot holes and holes from other causes than knots shall be limited as provided for knots.

Shakes and Checks.

80. Shake shall be measured on the ends of a piece.

81. In joist and plank, and in beams and stringers, the size of a shake shall be taken as the shortest distance between lines enclosing the shake and parallel to the wide faces of the piece.

82. In posts and timbers, the size of a shake shall be measured between lines parallel to each pair of opposite faces, and the greater of these two distances shall be taken as its size.

83. Checks and splits shall be limited as provided for shakes. No checks or combinations of checks with shakes which would reduce the strength to a greater extent than the allowable shake shall be permitted.

Pitch Pockets.

84. Pitch pockets ordinarily are not defects in a structural grade. A large number, however, indicates a general lack of bond, and such a piece should be carefully examined for shakes.

Slope of Grain.

85. Slope of grain shall be measured over a distance which will assure the determination of the general slope of the grain not influenced by short, local deviations. In a piece in bending, it is of greatest importance on the top and bottom faces. If meeting the limitation of a grade in these locations, it may be somewhat greater elsewhere.

Wane.

86. Where wane is permitted, there shall be no combination of wane and knots which would reduce the strength more than the maximum allowable knot.

Weight.

87. No pieces of exceptionally light weight shall be permitted in any grade.

Basis of Measurement of Size.

88. The dressed dimensions specified in Paragraphs 23 to 27 inclusive, shall be minimum dimensions when measured green.

4. DENSITY AND CLOSE GRAIN.

89. Methods of measurement of Douglas Fir and Southern Pine for density are given for use with the dense grades. Methods of measurement for rate of growth shall be given for use in the case of species and grades where close grain is required.

Dense Douglas Fir.

90. Douglas fir of dense material shall average on either one end or the other not less



A "CLEMCO" Da Vinci Suite in the private office of Mr. Bulova, President, Bulova Watch Company, Empire Trust Building, New York. Installation made by Flint & Horner Company, Inc., New York.

"CLEMCO" Service for Architects

"CLEMCO" offers a selection of Desks and Fine Office Suites so broad as to encompass every need that will exactly complete your idea "as planned."

The individuality expressed through our many exclusive designs, the unexcelled richness of fine woods used, the strictly "CLEMCO" convenience features and the sturdy, but unseen, construction all combine to make "CLEMCO" the logical choice. Your "CLEMCO" choice will bring many merited compliments.

C

"CLEMCO" Architectural Service includes expert assistance in Office Planning together with a helpful booklet, "Pointers In Planning An Office," Office Plan Material, Photogravure and Printed Catalogs. Write for complete information.
C

THE CLEMETSEN CO.

Makers of a Complete and Exceptional Line of Desks and Fine Office Suites for Business, Bank and Professional Use

3430 West Division Street

Chicago, Illinois

Nation-wide Service Through the Better Office Furniture Representatives

than six annual rings per inch, and, in addition, one-third or more summerwood, the darker, harder portion of the annual ring, measured over a three-inch portion of a radial line located as described below. The contrast in color between summerwood and springwood shall be distinct.

91. Coarse grained material excluded by this rule shall be accepted as dense if averaging one-half or more summerwood.

92. In inspection for density, reasonable variation of opinion between inspectors must be recognized. In reinspection of a particular lot of timbers for density, for every three timbers accepted as having one-third or more summerwood, one of the remaining timbers shall be accepted if agreed upon as having between 30 and 33-1/3% summerwood.

Close Grained Douglas Fir.

93. Douglas fir of close grain shall average on either one end or the other not less than six nor more than twenty annual rings per inch, measured over a three-inch portion of a radial line located as described below.

Pieces averaging from five to six annual rings per inch shall be accepted as equivalent of close grain if having one-third or more summerwood.

Location of Radial Line in Douglas Fir.

94. The radial line shall be representative of the average growth on the cross-section.

95. When the radial line specified is not representative, it shall be shifted sufficiently to present a fair average, but the distance from the pith to the beginning of the three-inch portion of the line in boxed heart pieces shall not be changed.

96. In case of disagreement, two radial lines shall be chosen, and the number of rings per inch or percentage of summerwood shall be taken as the average determined on these lines.

97. In boxed heart pieces, the radial line shall run from the pith to the corner farthest from the pith. When the least dimension is six inches or less, the three-inch portion of the line shall begin at a distance of one inch from the pith. When the least dimension is more than six inches, the three-inch portion of the line shall begin at a distance from the pith equal to two inches less than one-half the least dimension of the piece.

98. In side cut pieces, the radial line shall be at a right angle to the annual rings and the center of the three-inch portion of the line shall be at the center of the end of the piece.

99. If a three-inch portion of a radial line cannot be obtained, the measurement shall be made over as much of a three-inch portion as is available.

Dense Southern Pine.

100. Southern Pine of dense material shall average on either one end or the other not less than six annual rings per inch, and, in addition, one-third or more summerwood, the darker, harder portion of the annual ring, measured over the third, fourth, and fifth inches of a radial line from the pith. The contrast in color between summerwood and springwood shall be sharp and the summerwood shall be dark in color, except in pieces having considerably above the minimum requirement for summerwood.

101. Coarse grained material excluded by this rule shall be accepted as dense if averaging one-half or more summerwood.

102. In inspection for density, reasonable variation of opinion between inspectors must be recognized. In reinspection of a particular lot of timbers for density, for every three timbers accepted as having one-third or more summerwood, one of the remaining timbers shall be accepted if agreed upon as having between 30 and 33-1/3 per cent summerwood.

Location of Radial Line in Southern Pine.

103. The radial line shall be representative of the average growth on the cross section.

104. In case of disagreement, two radial lines shall be chosen, and the number of rings per inch and percentage of summerwood shall

be taken as the average determined on these lines.

105. In boxed heart pieces, the measurement shall be made over the third, fourth, and fifth inches from the pith along the radial line.

106. In material containing the pith but not a five-inch radial line, which is less than two inches by eight inches in section or less than eight inches in width, that does not show over sixteen square inches on the cross section, the inspection shall apply to the second inch from the pith. In larger material that does not show a five-inch radial line, the inspection shall apply to the three inches farthest from the pith.

107. In cases where timbers do not contain the pith and it is impossible to locate it with any degree of accuracy, the same inspection shall be made over 3" on an approximate radial line beginning at the edge nearest the pith in timbers over three inches in thickness and on the second inch nearest the pith in timbers three inches or less in thickness.

5. JOIST AND PLANK.

Joists, Rafters, Plank, Factory Flooring, etc.

83. Nominal thicknesses: 2" to 4".

Nominal widths: 4" and wider.

Standard yard thicknesses, S1S or S2S: 3/8" off.

Standard widths, 4" to 7", S1E or S2E: 3/8" off.

8" and wider, S1E or S2E: 1/2" off.

Standard lengths: Multiples of two feet.

84. Knots on Wide Faces

(s) Dense Select and Select			(c) Dense Common and Common		
At edge of wide face	On center line of wide face	Width of face	At edge of wide face	On center line of wide face	
3/4"	1 1/4"	4"	1"	1 3/4"	1 3/4"
1 1/4"	2"	6"	1 1/4"	2 1/2"	2 1/2"
1 3/4"	2 5/8"	8"	2"	3 3/8"	3 3/8"
1 7/8"	3 1/4"	10"	2 1/2"	4 1/4"	4 1/4"
2 1/8"	4"	12"	3"	5 1/8"	5 1/8"
2 3/8"	4 1/4"	14"	3 1/4"	5 5/8"	5 5/8"
2 1/2"	4 3/8"	16"	3 3/8"	6"	6"

85. Knots on Narrow Faces of Boxed Heart Pieces, Middle Third of Length

(s) Dense Select and Select	Thickness of piece	(c) Dense Common and Common
5/8"	2"	7/8"
1"	3"	1 1/4"
1 1/4"	4"	1 3/4"

86. Sum of Diameters of Knots on Any Face, Center Half of Length, Not to exceed

(s) Dense Select & Select	(c) Dense Common and Common
1 1/2 times width of face	Two times width of face

87. Shakes and Checks

(s) Dense Select & Select	(c) Dense Common and Common
1/4 width of end Green	4/10 width of end
1/8 width of end Seasoned	4/9 width of end

88. Slope of Grain, Center Half of Length

(s) Dense Select & Select	(c) Dense Common and Common
1 in 12	1 in 10

89. Wane

(s) Dense Select & Select	(c) Dense Common and Common
1/4 width of any face	1/4 width of any face

90. Douglas fir or southern pine of dense grades shall be selected for density.

Douglas fir of Select grade shall be selected for close grain.

JOHNSON-SCHWEIZER CO.

G. A. SCHWEIZER, Pres.

U. G. JOHNSON, Sec'y & Treas.

EWALD W. DIERSEN, Director

Office and Factory

1249-1265 W. NORTH AVENUE

Telephone Brunswick 2911-2912

Established 1887

SPECIAL CABINET WORK



Director's Room, First National Bank, Hammond, Ind.

Weary & Alford, Bank Designers

EWALD W. DIERSEN, Pres.

U. G. JOHNSON, Sec'y & Treas.

G. A. SCHWEIZER, Vice-Pres.

A Reputation for High Grade Work

CHICAGO

SASH, DOOR & BLIND MANUFACTURING CO.



GENERAL BUILDING TRIM

Office and Factory: 1249-65 North Avenue
Corner Fleetwood Street

Telephones: Brunswick 2911-2912

6. BEAMS AND STRINGERS.

Beams, Girders, Stringers, etc.

91. Nominal thicknesses: 5" and thicker.
Nominal widths: 8" and wider.
Standard lengths: Multiples of two feet.
S1S, S1E, S2S or S4S: $\frac{1}{2}$ " off each way.

92. **Knots.**

(s) Dense Select and Select			(c) Dense Common and Common		
On narrow or horizontal face middle third of length	On Center line of wide or vertical face	Width of face	On narrow or horizontal face middle third of length	On Center line of wide or vertical face	
1 $\frac{1}{4}$ "	1 $\frac{1}{4}$ "	5"	2"	2"	2 $\frac{3}{8}$ "
1 $\frac{1}{2}$ "	1 $\frac{1}{2}$ "	6"	2 $\frac{3}{8}$ "	2 $\frac{3}{8}$ "	3 $\frac{1}{8}$ "
1 $\frac{3}{4}$ "	2"	8"	2 $\frac{3}{8}$ "	3 $\frac{1}{8}$ "	4"
2"	2 $\frac{1}{2}$ "	10"	3 $\frac{1}{8}$ "	4"	4 $\frac{1}{4}$ "
2 $\frac{1}{8}$ "	3"	12"	3 $\frac{3}{8}$ "	4 $\frac{1}{4}$ "	5 $\frac{1}{8}$ "
2 $\frac{1}{4}$ "	3 $\frac{1}{2}$ "	14"	3 $\frac{3}{8}$ "	5 $\frac{1}{8}$ "	5 $\frac{1}{2}$ "
2 $\frac{3}{8}$ "	3 $\frac{3}{8}$ "	16"	3 $\frac{7}{8}$ "	5 $\frac{1}{2}$ "	6 $\frac{1}{8}$ "
	3 $\frac{5}{8}$ "	18"		5 $\frac{7}{8}$ "	6 $\frac{1}{2}$ "
	3 $\frac{7}{8}$ "	20"		6 $\frac{1}{8}$ "	6 $\frac{3}{4}$ "
	3 $\frac{7}{8}$ "	22"		6 $\frac{1}{2}$ "	
	4 $\frac{1}{4}$ "	24"		6 $\frac{3}{4}$ "	

93. Sum of Diameters of Knots on Any Face, Center Half of Length, Not to Exceed

(c) Dense Common and Common

- (s) Dense Select & Select
Width of face $1\frac{1}{2}$ times width of face

94. **Shakes and Checks**

(c) Dense Common and Common

- (s) Dense Select & Select
 $\frac{1}{4}$ width of end Green $4/10$ width of end
 $\frac{1}{8}$ width of end Seasoned $4/9$ width of end

95. Slope of Grain, Center Half of Length

(c) Dense Common and Common

- (s) Dense Select & Select
1 in 15 1 in 10

96. **Wane**

(c) Dense Common and Common

- (s) Dense Select & Select
 $\frac{1}{4}$ width of any face $\frac{1}{4}$ width of any face

97. Douglas fir or southern pine of dense grades shall be selected for density.

Douglas fir of Select grade shall be selected for close grain.

7. POSTS AND OTHER TIMBERS.

Posts, Caps, Sills, Timbers, etc.

98. Nominal sizes: 6" x 6" and larger.
Standard lengths: Multiples of two feet.

S1S, S1E, S2S or S4S: $\frac{1}{2}$ " off each way.

99. ***Knots.**

(s) Dense Select and Select	Width of face	(c) Dense Common and Common
1 $\frac{1}{2}$ "	6"	2 $\frac{3}{8}$ "
2"	8"	3 $\frac{1}{8}$ "
2 $\frac{1}{2}$ "	10"	4"
3"	12"	4 $\frac{1}{4}$ "
3 $\frac{1}{4}$ "	14"	5 $\frac{1}{8}$ "
3 $\frac{3}{8}$ "	16"	5 $\frac{1}{2}$ "
3 $\frac{3}{8}$ "	18"	5 $\frac{7}{8}$ "
3 $\frac{7}{8}$ "	20"	6 $\frac{1}{8}$ "
4"	22"	6 $\frac{1}{2}$ "
4 $\frac{1}{4}$ "	24"	6 $\frac{3}{4}$ "

*In sizes smaller than 6" x 6", knots shall not exceed:

In Dense select and select... $\frac{1}{4}$ width of face
In Dense common and common... $4/10$ width of face.

Sum of Diameters of all Knots
Within any 6" of Length, Not to Exceed
Dense Select and Dense Common and Common

Twice size of maximum knot allowable; nor to be two of maximum allowable knots in same 6 inches of length on any one face.

101. **Shakes and Checks.**

(c) Dense Common and Common

- (s) Dense Select & Select
 $4/10$ width of end... Green $1/2$ width of end
 $1/2$ width of end Seasoned $6/10$ width of end

102. **Slope of Grain**

(c) Dense Common and Common

- (s) Dense Select & Select
1 in 10 1 in 8

103. **Wane.**

(c) Dense Common and Common

- (s) Dense Select & Select
 $\frac{1}{8}$ width of any face $\frac{1}{4}$ width of any face

104. Douglas fir or southern pine of Dense grades shall be selected for density.

Douglas fir of Select grade shall be selected for close grain.

INDEX TO REFERENCE CODE TO STRUCTURAL GRADES

	Dense Select Douglas Fir and Southern Pine	Select Douglas Fir and Southern Pine	Select Other Softwoods	Common All Softwoods
Joist and Plank.....	1	2	3	4
Beams and Stringers.....	5	6	7	8
Posts and Timbers.....	9	10	11	12

REFERENCE CODE TO STRUCTURAL GRADES

Note—This is not a part of "American Lumber Standards." It is only a suggested adaptation of same which seems to be in accord with common practice.

Numbers refer to Paragraphs of Basic Provision for Structural Material of American Lumber Standards.

1. **Joist and Plank.** Dense Select, Douglas Fir and Southern Pine. 61(a), 62(a), 63, 64, 65, 66, 69, 70, 71, 72, 73, 74, 75, 80, 81, 82, 83, 84(s), 85(s), 86(s), 87(s), 88(s), 89(s).

2. **Joist and Plank.** Select, Douglas Fir and Southern Pine. 61(b), 62(a), 63, 64, 65, 66, 69, 70, 71, 72, 73, 74, 75, 79, 80, 81, 83, 84(s), 85(s), 86(s), 87(s), 88(s), 89(s).

3. **Joist and Plank.** Select, Other Softwood Species. 61(b), 62(a), 63, 64, 65, 66, 69, 70, 71, 72, 73, 74, 75, 83, 84(s), 85(s), 86(s), 87(s), 88(s), 89(s).

4. **Joist and Plank.** Common, All Softwood Species. 61(c), 62(a), 63, 64, 65, 66, 69, 70, 71, 72, 73, 74, 75, 83, 84(c), 85(c), 86(c), 87(c), 88(c), 89(c).

5. **Beams and Stringers.** Dense Select, Douglas Fir and Southern Pine. 61(a), 62(b), 63, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 80, 81, 82, 91, 92(s), 93(s), 94(s), 95(s), 96(s).

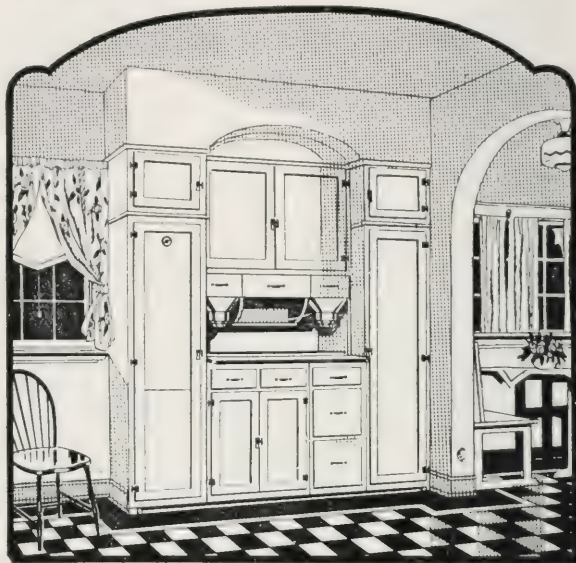
6. **Beams and Stringers.** Select, Douglas Fir and Southern Pine. 61(b), 62(b), 63, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 79, 80, 81, 91, 92(s), 93(s), 94(s), 95(s), 96(s).

7. **Beams and Stringers.** Select, Other Softwood Species. 61(b), 62(b), 63, 64, 66,

An Entirely NEW IDEA

for
Modern
Kitchens
— Large
and Small

1866
CURTIS
WOODWORK



A practical combination assembled from Curtis standard sectional kitchen units. There are limitless combinations.

NEW additions to the line of Curtis Woodwork include sectional kitchen units which enable the architect to design kitchens of beauty and convenience, and utilize every available inch of desirable work and storage space.

Now, instead of trying to crowd bulky ready-made dressers or combinations into the room, you can select Curtis units which will assemble into the most practical combination for the space available. They fit together as snugly as drawers in a desk.

The flexibility of these new Curtis sectional kitchen units is unlimited. For residential work—single houses or developments—apartment houses, country clubs, hotels, lodge buildings and churches which incorporate large kitchens; in fact, for any of your work which includes a kitchen, you have at your command, an entirely new idea for designing kitchens of unusual beauty and of still more unusual comfort and convenience.

See the Curtis Woodwork dealer in your city for complete information, or write us and literature will be sent you.

Curtis Door & Sash Company

1414 S. Western Ave.

Telephone CANAL 4900

Chicago

Buying quality at the outset saves expense and dissatisfaction later

67, 68, 69, 70, 71, 72, 73, 74, 75, 91, 92(s), 93(s), 94(s), 95(s), 96(s).

8. **Beams and Stringers.** Common, All Softwood Species. 61(c), 62(b), 63, 64, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 91, 92(c), 93(c), 94(c), 95(c), 96(c).

9. **Posts and Timbers.** Dense Select, Douglas Fir and Southern Pine. 61(a), 62(c), 63, 64, 65, 71, 72, 73, 74, 75, 80, 81, 82, 98, 99(s), 100, 101(s), 102(s), 103(s).

10. **Posts and Timbers.** Select, Douglas Fir and Southern Pine. 61(b), 62(c), 63, 64, 65, 71, 72, 73, 74, 75, 79, 80, 81, 98, 99(s), 100, 101(s), 102(s), 103(s).

11. **Posts and Timbers.** Select, Other Softwood Species. 61(b), 62(c), 63, 64, 65, 71, 72, 73, 74, 75, 98, 99(s), 100, 101(s), 102(s), 103(s).

12. **Posts and Timbers.** Common, All Softwood Species. 61(c), 62(c), 63, 64, 65, 71, 72,

73, 74, 75, 98, 99(c), 100, 101(c), 102(c), 103(c).

(s) Grade Provision for Dense Select and Select Grade.

(c) Grade Provision for Common Grade. No heartwood requirements are provided in these grades. Heartwood requirements when ordered should be specified in terms of heartwood required on the girth, or on each face side or edge. Girth shall be measured at the point where the greatest amount of sapwood occurs. (See par. 76.)

Wane is permitted in all grades, but square edges may be specified when appearance or use requires. (See par. 78.)

Douglas Fir and Southern Pine of select grade are required to be of close grain.

Douglas Fir and Southern Pine of dense select grade are required to be of dense material.

COMMON USE OF AMERICAN LUMBER STANDARD GRADES IN GENERAL BUILDING CONSTRUCTION.

Frame Construction.

Item	Grade—American Lumber Standards
Sills and Plates	No. 1 Common Dimension
Posts	Common Posts and Timbers
Girders	Select or Common Beams and Stringers
Studs	No. 1 or 2 Common Dimension
Joist	Common Joist and Plank
Rafters	Common Joist and Plank
Bridging and Furring	No. 2 Common Strips
Under-Flooring	No. 1 or 2 Common Boards
Sheathing	No. 1 or 2 Common Boards
Roof Boarding	No. 1 or 2 Common Strips or Boards
Shingles: Roofs	A
Walls	B
Finished Flooring	B Flooring
Porch Flooring	B Flooring, Vertical Grain
Stepping	B Stepping, Vertical Grain
Siding	B or C Siding
Ceiling	B or C Ceiling
Partition	B or C Partition
Finish and Trim:	
Interior	B for Natural Finish C for Paint Finish
Exterior	B or C Finish
Window Frames:	
Exposed Portions	B Select
Covered Portions	No. 1 Common or Better

Timber Construction.

Item	Grade—American Lumber Standards
Caps and Sills	Select Posts and Timbers
Posts	Select or Dense Select Posts and Timbers
Knee Braces	Select Posts and Timbers
Sway Braces	Select or Common Joist and Plank
Girders	Select or Dense Select Beams and Stringers
Beams	Select or Dense Select Beams and Stringers
Joist	Select or Common Joist and Plank
Planking: Flat	Select or Common Joist and Plank
Laminated	Select or Common Joist and Plank
Platform	Select Joist and Plank, Vertical Grain
Stepping	B or C Stepping, Vertical Grain
Truss Members:	
Tension	Select Beams and Stringers
Compression	Select Posts and Timbers
Diagonal	Select Posts and Timbers
Finished Flooring	B Flooring, Vertical Grain
Ceiling	B or C Ceiling
Partitions: Plank	No. 1 Common Dimension
Finished	B or C Partition
Finish: Interior	B for Natural Finish C for Paint Finish
Exterior	B or C Finish
Window Frames:	
Exposed Portions	B Select
Covered Portions	No. 1 Common or Better

Notes on the Use of Recommended Grades.

1. Grades recommended are the grades most commonly used. For temporary construction, a grade lower may often be used. For work of the highest character, a grade higher may be desired.

2. Where alternate grades are given, the choice in structural grades would depend on the working stress used; in other grades it

would depend on the grades or character of material available in a particular locality.

3. Wane is permitted in structural grades. Square edges may be specified when required for bearing or desired for appearance.

4. Heartwood and sapwood of equivalent character are of equal strength. No requirement of heartwood need be made when strength alone is the governing factor.

5. Heart requirement, when durability of untreated wood, subject to exposure, is a

ROBBINS

HARD MAPLE

FLOORING



NO MATTER what your flooring requirements are whether for a fine residence or the roughest sort of factory installation you will find a size and grade in Robbins Hard Maple Flooring to meet your demands.

You can make your selection from three standard grades with five thicknesses and four widths in each grade, which is graded and inspected according to grading rules laid down by the Maple Flooring Manufacturers Association.

A large well seasoned stock at the mill and exceptional manufacturing facilities assure you of a good delivery on standard sizes or any special requirement.



ROBBINS FLOORING CO.

RHINELANDER, WIS.



Write us for descriptive folder showing the actual sizes of all flooring manufactured by us.

factor, may be specified in any grade. Heartwood requirement should be in terms of the percentage of heartwood required on the girth, or on each face, side or edge.

6. A loose knot or knot hole does not reduce strength any more than a tight knot, so no distinction is made in structural grades between knots and knot holes. Where appearance is a factor, tight knotted stock should be specified.

7. The provisions of the Joist and Plank grades are such that working stresses for these grades may be applied to material used with wide faces vertical or horizontal.

8. Joist or Beam grades may be used for pieces in direct tension, such as bottom

chords of trusses, increase in size of defects toward ends being permissible because of the gradual application of stresses through splice plates or end connections. The same stresses may be used in direct tension as for extreme fiber stress in bending.

9. Loads concentrated near a support give a calculated shearing stress higher than is actually developed. In calculating the shear at one end of a beam the concentrated loads between that end and a point distant three times the depth of the beam from the support may be considered as acting at this point.

10. Shear stresses for joint details may be taken as 50 per cent greater than the values for horizontal shear given in the table.

DESCRIPTION OF SOUTHERN PINE ASSOCIATION STANDARD SPECIFICATION FOR THE SELECTION AND INSPECTION OF DENSE LONGLEAF AND SHORTLEAF SOUTHERN YELLOW PINE.

STRUCTURAL GRADES.

The Structural Grading Rules of Southern Yellow Pine furnish material suitable for all construction uses. All structural material is classified by grades in which defects are limited and which require certain qualities in the clear wood. Consideration has been given to factors which reduce the strength and to factors that clearly indicate strength above the average.

Four grades of Southern Yellow Pine timbers are furnished, each of which is especially suitable for certain classes of work. The four grades are: Select Structural, Dense Heart, Structural Square Edge and Sound, and Number One Common.

All of the timber grades Except No. 1 Common, have a density requirement. Select Structural and Dense Heart have heartwood requirements.

SELECT STRUCTURAL TIMBERS.

Select Structural grade requires all material to conform to the density requirement and to show 85 per cent heartwood, girth measurement. This grade is obtainable only on special orders. It is for use where exceptional conditions require unusually high unit strength values, such as in extra long bridge spans or under heavily loaded floors in mill construction where clear floor space with a limited number of columns is required.

DENSE HEART.

Dense Heart Grades require all material to conform to the Density requirement and to show some heart the entire length on one side on pieces under 9 inches, and some heart the entire length on two opposite faces on pieces 9 inches and over. Dense Heart is the grade expected to furnish most of the timbers used in heavy construction work where high breaking strength is desired. This grade can be cut in sufficient quantities to supply all the heavy construction timbers which the trade will use.

STRUCTURAL SQUARE EDGE AND SOUND.

Structural Square Edge and Sound requires all material to conform to the density requirement. Unless otherwise specified, this grade admits any amount of sapwood. This grade is for general use in building construction and to a large extent in mill construction. It is especially adapted to treatment with chemical preservatives.

SOUTHERN PINE FACTORY FLOORING AND ROOFING PLANK.

SELECT MERCHANTABLE.

This grade is for use where durability and strength are required. It must be free from wane and must show two-thirds heart surface the entire length of the piece on one side, and show some heart two-thirds the length on the opposite side. This grade will admit sound knots, the average diameter of any one knot not to exceed approximately

NO. 1 COMMON TIMBERS.

No. 1 Common grade is intended for general use and in small houses, false work, and ordinary construction where strength requirements are not so critical. This grade is also suitable where stiffness is the controlling factor. As the stiffness of the low grades is only slightly less than that of the higher grades, the consumer can obtain a material in this grade suitable for his purpose at a low cost.

UTILITY TIMBERS.

Timbers that are intended for remanufacture or for industrial uses are grouped under UTILITY TIMBERS. The grades of UTILITY TIMBERS are, Merchantable, Square Edge and Sound and No. 1 Common. Density is not required in these grades unless otherwise specified.

MERCHANTABLE TIMBERS.

Merchantable Timbers may be specified Dense; shall show two-thirds or more heart surface on one of the wide faces on sizes under 9 inches, and two-thirds or more heart surface on both of the wide faces on pieces 9 inches and over. This grade is well manufactured and is suitable for uses in which the application of working stresses is not necessary, and for remanufacture into material where durability is important.

SQUARE EDGE AND SOUND.

Square Edge and Sound timbers may be specified Dense. Unless otherwise specified, this grade will admit any amount of sapwood. This grade is well manufactured and is suitable for remanufacture into material that may easily be treated with a chemical preservative. This grade is well suited for uses where working stresses are not applied and conditions surrounding its use do not require unusual durability.

NO. 1 COMMON.

No. 1 Common Timbers are classed under Utility Timbers, although this grade is especially adapted to small building construction. Unless otherwise specified, this grade will admit any amount of sapwood.

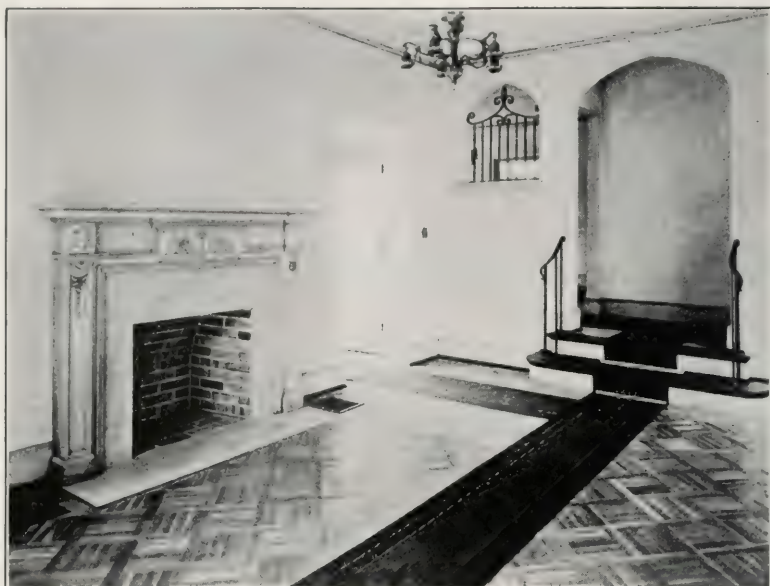
HEART TIMBERS.

All timber specifications except Merchantable, Dense Heart, and Select Structural Timbers specifying heart requirements, shall be considered as a special contract, and shall specify whether the heart requirements refer to surface or girth measurements in each piece.

one-fourth the cross section of the piece in the rough, if located at the edge, or one-third the cross section if located away from the edge. Other defects also limited.

STANDARD.

This grade is for use where strength is required without reference to durability. It must be free from wane. This grade will



Hardwood Floors

We lay hardwood floors at a cost not to exceed that of carpets and in any design required to harmonize with the interior.

Parquetry floors laid in our mastic are ideal for apartments, homes, ballrooms, gymnasiums, factories, etc. They are space saving, economical, durable, resilient and quiet.

Plank floors with ebonized cracklines and butterflies are particularly adaptable to the early American atmosphere.

(Licensed floor layers of Cellized Oak Flooring.)

H. J. NORTH, Inc.

35 West Kinzie Street

Superior 6501-3451

CHICAGO, ILL.

admit sound knots, the average diameter of any one knot not to exceed approximately one-fourth of the cross section of the piece in the rough, if located at the edge, or one-third the cross section if located away from the edge. Other defects also limited.

GRADING RULES.

Detailed specifications for these grades are given in "Standard Specifications For Grades of Dense Longleaf and Shortleaf Southern Yellow Pine", issued by the Southern Pine Association, New Orleans, La.

DESCRIPTION OF WEST COAST LUMBERMEN'S ASSOCIATION STANDARD STRUCTURAL GRADES FOR DOUGLAS FIR

Structural Grades

The Structural grades of the West Coast Lumbermen's Association conform to the Grades and Uses of the Basic Provisions for Structural Material of American Lumber Standards, for the selection and inspection of softwood dimension and timbers where working stresses are required, and in addition provide a Super-Structural grade in each of the three Use classifications for use when material of exceptionally high character is required.

Grades and Use Classifications

- Grades: (a) Super-Structural
(b) Structural
(c) Common Structural
- Uses: (a) Joist and Plank
Joists, Rafters, Scaffold Plank, Factory, Flooring, etc.
(b) Beams and Stringers
Beams, Girders, Stringers, etc.
(c) Posts and Timbers.
Posts, Caps, Sills, Timbers, etc.

Material for each of the three Use classifications can be obtained in each of the three Grade classifications, and in addition, dense material may be specified in each of the three Grade classifications, making eighteen Grade-Use combinations to provide suitable material for every possible structural requirement.

The Structural grades are equivalent to the Select Structural grades of the Basic Provisions. The Common Structural grades are equivalent to, or better than, the Common Structural grades of the Basic Provisions. The Super-Structural grades provide material of higher quality than the Select Structural grades of the Basic Provisions.

The majority of requirements in Joist and Plank will be met by the Common Structural grade, as in proper design of material for these purposes stiffness is usually the governing factor and exceptionally high bending strength can not be utilized.

In Beams and Stringers, high bending strength is usually desired, and in this use the Structural grade will usually be desired, with Super-Structural grade where exceptionally heavy loads are to be carried, or minimum possible sizes are desired.

In Posts and Timbers, the Common Structural grade will usually provide material of ample size for the loads to be carried, but the Structural grade will more often be desirable, because of the requirement of close grain and the minimum checking which this provides in square timbers of considerable size.

In truss members, maximum strength or minimum size are often required, and Super-Structural grades may often be desired for this use.

The Super-Structural and Dense Structural grades are equal in strength, hence give interchangeability in material of close grain and small defects, or dense material with larger defects.

Standard Grades

Standard Grading and Dressing Rules West Coast Lumbermen's Association, Seattle, Washington, dated July 1, 1929.

209. Super Structural Posts and Timbers.

Must be sound, square-edged, well manufactured and close grained as defined in Para-

graph 301; free from spiral or diagonal grain with a slope of more than 1" in a length of 20". Will admit occasional slight variation in sawing and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

- $\frac{3}{4}$ " on a 6" face.
- 1" on an 8" face.
- $1\frac{1}{4}$ " on a 10" face.
- $1\frac{1}{2}$ " on a 12" face.
- $1\frac{3}{4}$ " on a 14" face.
- 2" on 16" and wider faces.

Checks—seasoning.

Pitch Pockets—not over 6" in length.

Sap— $\frac{1}{4}$ width, $\frac{1}{8}$ thickness.

210. Structural Posts and Timbers.—Must be sound, square-edged, well manufactured and close grained as defined in Paragraph 301; free from spiral or diagonal grain with a slope of more than 1" in a length of 15". Will admit occasional slight variation in sawing, and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

- $1\frac{1}{4}$ " on a 6" face.
- $1\frac{1}{2}$ " on an 8" face.
- 2" on a 10" face.
- $2\frac{1}{2}$ " on 12" and wider faces.

In timbers having faces 24" or wider or lengths 50' and longer the size of knots may be proportionately larger in relation to their effect on the strength of the piece.

Checks—seasoning.

Pitch Pockets—medium.

Sap— $\frac{1}{4}$ thickness, $\frac{1}{3}$ width.

211. Common Structural Posts and Timbers.—Must be sound, well manufactured, free from spiral or diagonal grain with a slope of more than 1" in a length of 10". Will admit occasional slight variation in sawing and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

- $1\frac{1}{2}$ " on a 6" face.
- 2" on an 8" face.
- $2\frac{1}{2}$ " on a 10" face.
- 3" on a 12" face.
- $3\frac{1}{2}$ " on 14" and wider faces.

Spike Knots.

Pitch Pockets.

Pitch Streaks.

Checks—seasoning.

Sap Stain—medium, 25% of any face.

Wane—2" wide on one corner or equivalent based on 10"x10".

213. Super Structural Joists, Etc.—Must be sound, square-edged, well manufactured and close grained as defined in Paragraph 301; free from spiral or diagonal grain with a slope of more than 1" in a length of 20". Will admit occasional slight variation in sawing and any number of the following defects, or their equivalent:

Knots—sound tight, if not in clusters, approximately:

- $\frac{1}{2}$ " on a 4" face.
- $\frac{3}{4}$ " on a 6" face.
- 1" on an 8" face.
- $1\frac{1}{4}$ " on a 10" face.
- $1\frac{1}{2}$ " on a 12" face.
- $1\frac{3}{4}$ " on a 14" face.
- 2" on 16" and wider faces.

Checks—seasoning.

Pitch Pockets—not over 6" in length.

Torn Grain.



THE RARE BEAUTY OF INTERIORS
IN
WOOD PANELING ~ WOOD FLOORS

SPECIAL WOODWORK
CABINET WORK
WOOD FLOORS

EXECUTED IN FOREIGN AND DOMESTIC WOODS

RALPH A. BOND COMPANY
INC.

SPECIAL WOODWORK & FLOOR BUILDERS

720 MICHIGAN AVENUE NORTH

CHICAGO

214. Structural Joists, Etc.—Must be sound, square-edged, well manufactured and close grained as defined in Paragraph 301; free from spiral or diagonal grain with a slope of more than 1" in a length of 15". Will admit occasional slight variation in sawing and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

$\frac{1}{2}$ " on 2" to 3" faces.
 $\frac{3}{4}$ " on a 4" face.
 1" on a 6" face.
 $1\frac{1}{2}$ " on an 8" face.
 $1\frac{3}{4}$ " on a 10" face.
 2" on a 12" face.
 $2\frac{1}{4}$ " on 14" and wider faces.

Checks—seasoning.

Pitch Pockets—medium.

Torn Grain.

Skips—small, not opposite each other.

215. Common Structural Joists, Etc.—

Must be sound, well manufactured, free from spiral or diagonal grain with a slope of more than 1" in a length of 10". Will admit occasional slight variation in sawing and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

$\frac{3}{4}$ " on 2" to 3" faces.
 1" on a 4" face.
 $1\frac{1}{2}$ " on a 6" face.
 2" on an 8" face.
 $2\frac{1}{2}$ " on a 10" face.
 3" on a 12" face.
 $3\frac{1}{4}$ " on 14" and wider faces.

Spike Knots—which do not weaken piece more than knots heretofore specified.

Pitch Pockets.

Pitch Streak.

Wane— $\frac{1}{4}$ thickness, $\frac{1}{4}$ width, $\frac{1}{3}$ length of piece.

Split—short, equal in length to width of piece.

Sap Stain—medium.

Checks—seasoning.

Torn Grain.

217. Super Structural Stringers, Etc.—

Must be sound, square-edged, well manufactured and close grained as specified in Paragraph 301; free from spiral or diagonal grain with a slope of more than 1" in a length of 20" in the center three-fourths of the length of the piece. Will admit occasional slight variation in sawing, and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

Width Inches	Size of Knot On Narrow Faces Inches	Size of Knot on Center Line of Wide Face Inches
5	$\frac{1}{2}$	...
6	$\frac{3}{4}$	...
8	1	1
10	1	$1\frac{1}{4}$
12	$1\frac{1}{4}$ Maximum	$1\frac{1}{2}$
14	...	$1\frac{3}{4}$
16	...	2 Maximum

The diameter of a knot on the narrow face shall be measured between lines parallel to the edges of the narrow face. On the wide face the knot shall be measured on the smallest diameter. Knots at the edges of a wide face are limited to the same size as on the adjacent narrow face, but measured on the smallest diameter, and the sizes may increase proportionately to the size allowed at the center line of the wide face.

Checks—seasoning.

Pitch Pockets—medium.

Sap—1" on narrow face 2" on wide face measured over its widest point.

218. Structural Stringers, Etc.—Must be sound square-edged, well manufactured and close grained as defined in Par. 301; free from spiral or diagonal grain with a slope

of more than 1" in a length of 15" in the center three-fourths of the length of the piece. Will admit occasional slight variation in sawing, and any number of the following defects, or their equivalent:

Knots—sound tight, if not in clusters, approximately:

Width of Face Inches	Size of Knot On Narrow Faces Inches	Size of Knot on Center Line of Wide Face Inches
5	1	...
6	$1\frac{1}{4}$	...
8	$1\frac{1}{2}$	$1\frac{3}{4}$
10	$1\frac{3}{4}$	$2\frac{1}{4}$
12	$1\frac{3}{4}$	$2\frac{1}{2}$
14 & wider	2 Maximum	3 Maximum

The diameter of a knot on the narrow face shall be measured between lines parallel to the edges of the narrow face. On the wide face the knot shall be measured on the smallest diameter. Knots at the edges of a wide face are limited to the same size as on the adjacent narrow face, but measured on the smallest diameter, and the sizes may increase proportionately to the size allowed at the center line of the wide face.

Pitch Pockets—medium.

Checks—seasoning.

Sap—2" on edges and 3" on faces, measured over its widest point.

219. Walking Beams.—This item shall be graded by the same rule as Par. 218, except that sap shall not be limited.

220. Common Structural Stringers, Etc.—

Must be sound, well manufactured, free from spiral or diagonal grain with a slope of more than 1" in a length of 12" in the center $\frac{1}{2}$ of the length of the piece. Will admit occasional slight variation in sawing and any number of the following defects or their equivalent:

Knots—sound tight, if not in clusters, approximately:

Width of Face Inches	Size of Knot On Narrow Faces Inches	Size of Knot on Center Line of Wide Face Inches
5	$1\frac{1}{2}$	...
6	$1\frac{3}{4}$	...
8	2	$2\frac{1}{2}$
10	$2\frac{1}{4}$	3
12	$2\frac{1}{2}$	$3\frac{1}{2}$
14	$2\frac{3}{4}$	$3\frac{3}{4}$
16	3 Max.	4 Max.

The diameter of a knot on the narrow face shall be measured between lines parallel to the edges of the narrow face. On the wide face the knot shall be measured on the smallest diameter. Knots at the edges of a wide face are limited to the same size as on the adjacent narrow face, but measured on the smallest diameter, and the sizes may increase proportionately to the size allowed at the center line of the wide face.

Checks—seasoning.

Pitch Pockets.

Pitch Streaks.

Sap—medium stain 25% of face.

Wane— $1\frac{1}{2}$ " wide on one corner or equivalent based on 10" face.

302. Dense material shall average on either one end or the other of a piece not less than six annual rings per inch and, in addition, one-third or more summerwood (the dark portion of the annual ring), measured over the same portion of a radial line as provided for close grain. The contrast in color between summerwood and springwood shall be distinct.

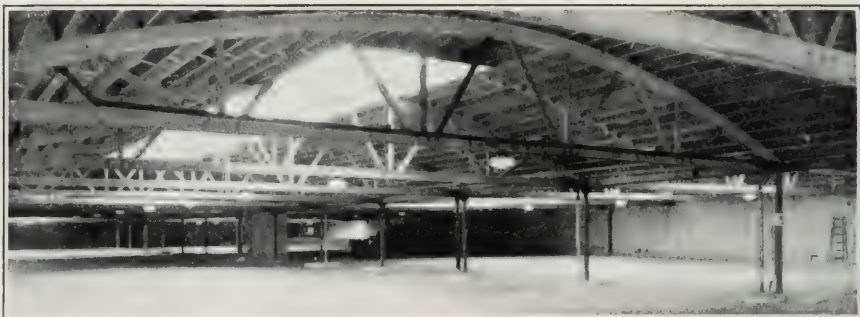
Coarse grained material excluded by this rule shall be accepted as dense if averaging one-half or more summerwood.

In case of disagreement, two radial lines shall be chosen and the summerwood and number of rings shall be taken as the average on these lines.



Gateway Garage, Chicago.

John Hocke, Architect.



Second Floor, Gateway Garage, using thirty-two American Roof Trusses, spans vary from 50 ft. to 88 ft.

American Roof Trusses are specified by
America's Leading Architects
from coast to coast

Installations by our own men everywhere
21 years' experience

AMERICAN ROOF TRUSS COMPANY

Wm. H. Waddington, President

BUILDERS BUILDING

228 NORTH LA SALLE STREET, CHICAGO

Telephone, Franklin 1720-1721



Architects are invited to submit their truss problems to our engineers who are always ready to cooperate with them regarding economical lay-outs.

AMERICAN STANDARD LUMBER

MARCH, 1928

CHICAGO RETAIL LUMBER DEALERS ASSOCIATION

TABLE OF STRENGTH YELLOW PINE & DOUGLAS FIR BEAMS CHICAGO BUILDING ORDINANCE (1910)

FIBRE STRESS 1300 LBS. IN²

SHEAR 130 LBS. IN²

LOAD IN POUNDS (UNIFORMLY DISTRIBUTED)

BASED ON ACTUAL DRESSED SIZES

Weight of Beam Included

STRENGTH
Unplastered Construction
Width in Inches

DEFLECTION LIMITED
Plastered Construction
Width in Inches

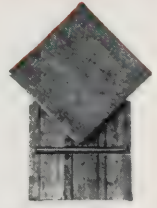
2 in.	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.	Span in Feet	2 in.	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.
6 in. Beam = 5½ in. Load in Pounds Except 6 x 6 = 5½ x 5½ in.								6 in. Beam = 5½ in. Load in pounds. Except 6 x 6 = 5½ x 5½ in.						
1485	2398	3314	4806	.....	.....	.....	5	1485	2398	3314	4806	.....	.....	.....
1237	1999	2761	4005	.....	.....	.....	6	1237	1999	2761	3922	.....	.....	.....
1061	1713	2367	3428	.....	.....	.....	7	910	1471	2031	2881	.....	.....	.....
928	1499	2071	3004	.....	.....	.....	8	697	1126	1555	2206	.....	.....	.....
825	1332	1841	2670	.....	.....	.....	9	551	890	1229	1743	.....	.....	.....
742	1199	1657	2403	.....	.....	.....	10	446	720	995	1412	.....	.....	.....
675	1090	1506	2184	.....	.....	.....	11	368	595	822	1167	.....	.....	.....
618	999	1380	2002	.....	.....	.....	12	309	500	691	980	.....	.....	.....
8 in. Beam = 7½ in.								8 in. Beam = 7½ in.						
1885	3046	4207	6383	8705	.....	.....	7	1885	3046	4207	6383	8705	.....	.....
1649	2666	3681	5585	7616	.....	.....	8	1649	2666	3681	5585	7616	.....	.....
1466	2369	3272	4965	6770	.....	.....	9	1306	2109	2913	4420	6028	.....	.....
1319	2132	2944	4468	6093	.....	.....	10	1057	1708	2360	3580	4882	.....	.....
1199	1938	2677	4062	5539	.....	.....	11	874	1412	1950	2959	4035	.....	.....
1099	1777	2454	3723	5077	.....	.....	12	734	1186	1638	2486	3390	.....	.....
1015	1640	2265	3437	4687	.....	.....	13	626	1011	1396	2118	2889	.....	.....
942	1523	2103	3191	4352	.....	.....	14	539	871	1204	1826	2491	.....	.....
879	1421	1963	2979	4062	.....	.....	15	470	759	1048	1591	2170	.....	.....
824	1333	1840	2792	3808	.....	.....	16	413	667	921	1398	1907	.....	.....
10 in. Beam = 9½ in.								10 in. Beam = 9½ in.						
2647	4277	5907	8962	12221	15479	.....	8	2647	4277	5907	8962	12221	15479	.....
2353	3801	5251	7966	10863	13759	.....	9	2353	3801	5251	7966	10863	13759	.....
2118	3421	4725	7169	9776	12383	.....	10	2118	3421	4725	7169	9776	12383	.....
1925	3110	4296	6518	8888	11258	.....	11	1776	2870	3963	6014	8201	10388	.....
1765	2851	3938	5974	8147	10319	.....	12	1493	2411	3330	5053	6891	8728	.....
1629	2632	3635	5515	7520	9526	.....	13	1272	2055	2838	4305	5871	7437	.....
1512	2444	3375	5121	6983	8845	.....	14	1096	1772	2447	3712	5062	6413	.....
1412	2281	3150	4779	6517	8255	.....	15	955	1543	2131	3234	4410	5586	.....
1323	2138	2953	4481	6110	7739	.....	16	839	1356	1873	2842	3876	4909	.....
1245	2012	2779	4217	5771	7284	.....	17	743	1201	1659	2518	3433	4349	.....
1176	1900	2625	3983	5431	6879	.....	18	663	1071	1480	2246	3062	3879	.....
1114	1800	2487	3773	5157	6517	.....	19	595	962	1328	2015	2748	3481	.....
1059	1710	2362	3584	4888	6191	.....	20	537	868	1199	1819	2480	3142	.....

Continued on next page.



*CELLized OAK FLOOR BLOCKS

laid throughout these modern Chicago apartments. Widely used also in hotels, clubs, stores, office buildings, schools, and similar structures.



Front and back of 6 3/4" block

Laid rapidly in **EVERBOND**, a plastic cement, without nails, directly over wood or concrete, providing a firm, quiet, and sound-deadening floor. The blocks are *CELLized by a chemical treat, to reduce the tendency to change in size, and to guard against insect attacks and rot.

Each block is a complete unit of three or more flooring strips, in oak, walnut, maple, beech, red gum, light and dark "Oriental," either beveled or square edge; in several sizes, ranging from 6" to 12" squares, standard 13, 16" thickness; all grades.

See our catalog in *Sweet's*
24th Edition



East Elm Street
M. Nally & Quinn, Architects
6" and 9" blocks



3260-70 Sheridan Road
Hooper & Janisch, Architects
Reliance Co., Inc., Contractors
100,000 square feet —
6 3/4", 9", 11 3/4" blocks

At Left: Fullerton Tower
Fullerton and Clark Streets
McNally & Quinn, Architects
56,000 sq. ft. — 11 3/4" blocks

*CELLized oak floor blocks are sold through lumber dealers everywhere; manufactured by
E. L. BRUCE COMPANY . . . Memphis, Tenn. NASHVILLE HDW. FLOORING CO. Nashville, Tenn.
THE LONG-BELL LUMBER CO., Kansas City, Mo. ARKANSAS OAK FLOORING CO., Pine Bluff, Ark.

*CELLized Oak Flooring Inc.

MEMPHIS — TENNESSEE

For full information and estimates inquire of
*CELLized Oak Flooring Inc., Branch Office,
108 E. Ohio St., Chicago, or *CELLized
Oak Flooring Inc., Memphis, who will furnish
the name of the licensed flooring contractor
in your territory.

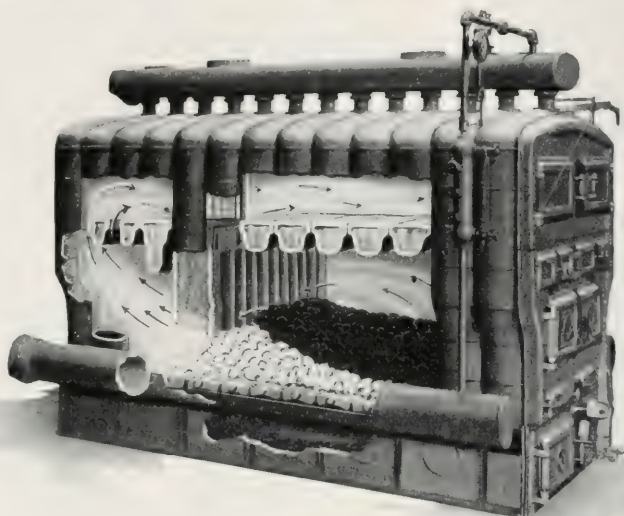
*CELLized wood floor blocks are
laid by Licensed Flooring
Contractors, and guaranteed by
*CELLized Oak Flooring, Inc.



2 in.	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.	Span in Feet	2 in.	3 in.	4 in.	6 in.	8 in.	10 in.	12 in.
12 in. Beam = 11½ in.								12 in. Beam = 11½ in.						
3239	5232	7225	11212	14950	18936	22923	9	3239	5232	7225	11212	14950	18936	22923
3017	5014	6924	10506	14326	18147	21968	10	3017	5014	6924	10506	14326	18147	21968
2743	4558	6295	9551	13024	16497	19971	11	2743	4558	6295	9551	13024	16497	19971
2514	4178	5770	8755	11939	15122	18306	12	2514	4178	5770	8755	11939	15122	18306
2321	3857	5326	8082	11020	13959	16898	13	2256	3645	5034	7638	10415	13193	15970
2153	3581	4946	7504	10239	12962	15691	14	1945	3143	4340	6586	8980	11375	13770
2011	3343	4616	7004	9551	12098	14645	15	1695	2738	3781	5737	7823	9909	11995
1886	3134	4327	6566	8954	11341	13730	16	1489	2406	3323	5042	6876	8709	10543
1775	2949	4073	6180	8427	10674	12922	17	1319	2131	2943	4466	6090	7715	9339
1676	2785	3847	5837	7959	10081	12204	18	1177	1901	2625	3980	5432	6881	8330
1588	2639	3644	5329	7540	9551	11562	19	1056	1706	2356	3575	4876	6176	7476
1508	2507	3462	5253	7163	9073	10984	20	953	1540	2126	3227	4400	5574	6747
1437	2387	3297	5003	6822	8641	10461	21	864	1397	1929	2927	3991	5055	6120
1371	2279	3147	4775	6512	8248	9985	22	788	1272	1757	2667	3636	4606	5576
1312	2180	3010	4568	6229	7890	9551	23	720	1164	1608	2440	3327	4214	5102
1257	2089	2885	4377	5969	7561	9153	24	662	1069	1477	2241	3056	3870	4685
14 in. Beam = 13½ in.								14 in. Beam = 13½ in.						
3802	6142	8482	13162	17550	22230	26910	11	3802	6142	8482	13162	17550	22230	26910
3564	5758	7952	12068	16452	20840	25227	12	3564	5758	7952	12068	16452	20840	25227
3290	5315	7340	11140	15187	19237	23287	13	3290	5315	7340	11140	15187	19237	23287
3055	4935	6816	10344	14102	17863	21623	14	3055	4935	6816	10344	14102	17863	21623
2851	4606	6361	9654	13162	16672	20182	15	2742	4429	6117	9281	12656	16031	19406
2673	4318	5964	9051	12339	15630	18920	16	2410	3893	5376	8157	11123	14089	17056
2516	4064	5613	8518	11613	14710	17807	17	2134	3448	4762	7225	9853	12481	15108
2376	3838	5301	8045	10968	13893	16818	18	1904	3076	4248	6445	8789	11132	13476
2251	3636	5022	7622	10391	13162	15933	19	1709	2760	3812	5784	7888	9991	12095
2138	3454	4771	7241	9871	12504	15136	20	1542	2491	3440	5220	7119	9017	10916
2037	3290	4544	6896	9401	11908	14415	21	1399	2260	3121	4735	6457	8179	9901
1944	3140	4337	6582	8974	11367	13760	22	1274	2059	2843	4314	5883	7452	9021
1859	3004	4149	6296	8584	10873	13162	23	1166	1884	2601	3947	5383	6818	8254
1782	2879	3976	6034	8226	10420	12613	24	1071	1730	2389	3625	4943	6262	7580
16 in. Beam = 15½ in.								16 in. Beam = 15½ in.						
4338	7007	9676	14682	20020	25359	30698	13	4338	7007	9676	14682	20020	25359	30698
4028	6506	8985	13633	18590	23547	28505	14	4028	6506	8985	13633	18590	23547	28505
3759	6073	8386	12724	17351	21978	26605	15	3759	6073	8386	12724	17351	21978	26605
3524	5693	7862	11929	16266	20604	24942	16	3524	5693	7862	11929	16266	20604	24942
3317	5358	7399	11227	15309	19392	23475	17	3231	5219	7208	10936	14913	18890	22887
3133	5060	6988	10603	14459	18315	22171	18	2882	4655	6429	9755	13302	16849	20397
2968	4794	6620	10045	13698	17351	21004	19	2586	4178	5770	8755	11939	15122	18306
2819	4554	6289	9543	13013	16483	19954	20	2334	3771	5207	7901	10775	13468	16521
2685	4337	5990	9088	12393	15698	19003	21	2117	3420	4723	7167	9773	12379	14985
2563	4140	5718	8675	11830	14985	18140	22	1929	3116	4304	6530	8905	11279	13654
2451	3960	5469	8298	11316	14333	17351	23	1765	2851	3937	5974	8147	10320	12492
2349	3795	5241	7952	10844	13736	16628	24	1621	2618	3616	5487	7482	9478	11473
2255	3643	5031	7634	10410	13186	15963	25	1494	2413	3333	5057	6896	8735	10573
2169	3503	4838	7341	10010	12679	15349	26	1381	2231	3081	4675	6375	8076	9776
18 in. Beam = 17½ in.								18 in. Beam = 17½ in.						
4792	7741	10690	16219	22117	27981	33914	15	4792	7741	10690	16219	22172	27981	33914
4492	7257	10022	15206	20735	26232	31794	16	4492	7257	10022	15206	20735	26232	31794
4228	6830	9432	14311	19515	24689	29924	17	4228	6830	9432	14311	19515	24689	29924
3993	6450	8908	13516	18431	23317	28262	18	3993	6450	8908	13516	18431	23317	28262
3783	6111	8439	12805	17461	22090	26774	19	3722	6013	8305	12600	17182	21764	26346
3594	5805	8017	12164	16588	20985	25435	20	3359	5427	7495	11372	15507	19642	23778
3422	5529	7636	11585	15798	19986	24224	21	3047	4922	6798	10314	14065	17816	21567
3267	5278	7289	11059	15080	19078	23123	22	2776	4485	6194	9398	12816	16233	19651
3125	5048	6972	10578	14424	18248	22118	23	2540	4104	5667	8598	11725	14852	17979
2995	4838	6681	10137	13823	17488	21196	24	2333	3769	5205	7897	10769	13640	16512
2875	4644	6414	9731	13270	16788	20348	25	2150	3473	4796	7278	9924	12571	15217
2764	4466	6167	9357	12760	16143	19566	26	1988	3211	4435	6729	9176	11622	14069

American Smokeless Boiler

For Steam, Hot Water or Vapor



SMOKELESS

Approved by the Smoke Inspectors of all principal cities.

EFFICIENT IN OPERATION

a result of

Scientific design based on 30 years' experience.

ECONOMY IN MAINTENANCE

Sections are quickly and easily removed lowering maintenance cost and insuring utmost reliability.

O. E. VAPOR-VACUUM HEATING

OUR AMERICAN SMOKELESS BOILER used with our O. E. VAPOR-VACUUM Heating System insures an ideal installation combining efficiency, flexibility and simplicity. Our Engineering Department will render immediate service to aid you in the design of O. E. Vapor-Vacuum Heating Systems.

For further information on our complete line of Plumbing and Heating supplies, kindly write for our New Catalogue and descriptive Booklets.

The Kellogg-Mackay Company

Plumbing and Heating Supplies

**Minneapolis
St. Paul**

**Chicago
Hutchinson**

**Kansas City
Duluth**

HEATING AND VENTILATION

By Samuel R. Lewis, Consulting Engineer, Chicago.

RESIDENCE HEATING.

A Discussion of Various Methods of Heating Detached Residences.

As of 1929, residence heating usually is done with vapor, hot water or warm air, depending on the size of the home and on the funds available for investment.

VAPOR HEATING, using radiators with both supply and return pipes, has the following advantages:

- (a) The pressure is very low, ranging from perhaps sixteen ounces to well below atmospheric pressure.
- (b) The amount of opening in the supply valve at the radiator governs the temperature of the radiator, so that a wide range of heat output from a single radiator is possible.
- (c) There are no air valves on the radiators.
- (d) Circulation of steam and water is rapid and noiseless.
- (e) Economy of fuel is inherent to such a heating system, since the heat output is reasonably proportioned to the intensity of the fire.
- (f) The supply valves may be at the tops of the radiators, where they are accessible.

Description of a Vapor Heating System.

With vapor heating there are usually a steam main and a return main above the water line of the boiler; the latter serving also as an air main, with an automatic device, usually close to the boiler, which permits all of the air to escape without permitting any of it to return to the interior of the piping and radiators. Where exigencies of construction require, there may be an auxiliary return below the water line, serving lowlying radiators, though in general, in residence heating plants of this type, no radiators should be closer to the water line of the boiler than the height necessary to create a head which will offset the pressure-difference between supply and return pipes.

In most types of vapor heating by gravity circulation, a difference in pressure of not exceeding eight ounces is allowed. The radiators have graduated supply valves and have resistance members, usually thermostatic traps, at their outlets. These permit the passage of condensation and air, but resist the passage of steam. If they fail to prevent passage of steam to the return pipes, the pressure differential will be lost and circulation will become sluggish.

Control of Vapor Heating Systems.

When solid fuel is burned in vapor systems of heating a delicately balanced damper regulator is installed, automatically to regulate the draft so as to maintain an even steam pressure. When gas or oil is burned in the boiler, the rate of fuel injected is controlled with nicety by electric interposition, using a switch actuated either by the steam pressure or by the steam temperature, and controlling the gas burner by a magnetically operated valve, or by a gas valve operated by a small electric motor. In some cases where the house is not compact, it is desirable to control the oil or gas fuel supply by means of an electrically operated thermostat placed in contact with the steam pipe at the most remote end of the main. This refinement has come about because of a tendency, with these rapidly reacting fuels, so quickly to heat the water in

the boiler as to cause the conventional controls to shut off the supply before circulation has become established in the remote and especially-exposed radiators.

All modern and efficient residence heating systems have automatic temperature control, usually from a centrally located thermostat, which may be actuated by electricity or by expansion and contraction of an enclosed volatile fluid, or by a manually wound-up mechanism.

Servicing of Vapor Systems.

Vapor systems for residences are usually proprietary in nature, and will be designed and serviced by the manufacturers, but the cost is usually so very little in excess of that of the old-fashioned single pipe steam systems and the advantages are so great that they should be installed even at a preference in investment cost.

Single-pipe Steam Heating Systems Obsolete.

SINGLE-PIPE STEAM HEATING in residences require a higher operating pressure than does vapor heating, with larger radiator connections, always at one end only, and always at the bottom of the radiator. Heat always is all on, or all off. There must be on each radiator an air valve, which discharges air when the pressure is increased, and which is rather temperamental and delicate in operation and maintenance. Failure by the tenant tightly to close a radiator supply valve may result in water hammer and annoyance, if not always in damage. Single pipe steam heating for residences is about to become obsolete.

Hot Water Heating Is a Favorite Method.

HOT WATER HEATING usually is somewhat more costly for first investment than other methods of heating for residences, as the radiators and mains may be larger. The output of heat from the radiators with hot water heating always is directly proportional to the intensity of the fire. There are, practically speaking, no air valves; and once adjusted, the hot water radiator valves in the ordinary residence seldom are touched. They may be left closed at night in sleeping rooms without danger of freezing, even with windows wide open, since they do not close perfectly tight, but allow a slow circulation of water which prevents the danger point in temperature from being reached. A surprisingly uniform temperature may be maintained, burning coal, with but one very simple self-contained thermostat, placed in the boiler-water, controlling the breeching-damper and adjusted manually as the season changes to maintain a corresponding water-temperature.

The Burner Must Not Be Too Large.

Hot water heating is well adapted to oil and gas fuels, but the best results are obtained when the gas flame or oil flame is kept so low as to operate most of the time. A too-large oil burner, for instance, may overheat the boiler water before the cooler water out in the remote radiators has time to return to the boiler. With the modern types of sectional gas boilers, this possible difficulty easily is controlled by seasonal manual shutting off of some of the sectional gas burners.

With fair workmanship, such as is now well nigh universal, gravity hot water heating in residences is exceedingly satisfactory and economical.

KEWANEE

Specialists in Steel Firebox Boilers,
Brick-Set and Portable; Up-Draft
and Down-Draft Smokeless, Type
C Smokeless. Built much stronger than A. S. M. E. Code requires.

BOILERS

Brick-Set Up-Draft Fire-Box

This has been the Standard Boiler for general use in the Central West for many years, and is the Boiler referred to in specifications as "Kewanee or equal".

Number of Boiler.....	0	1	2	3	4	5	6	8	9	10	11	12	13	14	15	16	17	18	19	20
Capacity, Steam...sq. ft.	700	900	1050	1200	1400	1700	2000	2600	3000	3500	4000	4500	5500	6500	7500	8700	10000	11000	12000	14000
Capacity, Water...sq. ft.	1150	1500	1700	2000	2300	2800	3300	4300	5000	5800	6600	7400	9100	10700	12400	14400	16500	18200	19800	23100
Diameter Boiler.....in.	24	30	30	30	36	36	36	42	42	48	48	48	54	54	60	60	66	66	72	72
Diameter of Stack.....in.	10	12	12	14	14	16	16	18	20	20	22	22	26	26	30	30	30	30	34	34
Minimum Height of Stack.....ft.	35	40	40	40	40	40	45	45	45	45	50	50	50	50	55	55	60	60	60	60

Portable Up-Draft Fire-Box

Requires less floor space and more height than above. No special skill in brick laying.

Number of Boiler.....	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424
Capacity, Steam...sq. ft.	2500	2900	3500	4000	4500	5000	5500	6000	7000	8000	9500	11000	13000	15000	17500	20000	25000	28000
Capacity, Water...sq. ft.	4100	4800	5800	6600	7400	8300	9100	9900	11600	13200	15700	18200	21500	24800	28500	32000	40000	45000
Diameter Boiler.....in.	48	48	48	54	54	54	60	60	60	60	66	66	72	72	78	78	84	84
Diameter Stack.....in.	20	20	20	22	22	22	24	24	26	26	28	30	32	32	34	34	38	40
Minimum Height Stack....ft.	50	50	55	55	55	60	60	60	65	65	65	70	70	70	80	90	90	100

Portable Smokeless Down-Draft Fire-Box

A Smokeless Boiler designed to burn cheap soft coal. Breaching connection at front, economical of space.

Number of Boiler.....	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324
Capacity, Steam...sq. ft.	3000	3500	4000	4500	5000	5500	6000	6500	7500	8500	10000	12000	14000	16000	18000	20000	25000	30000
Capacity, Water...sq. ft.	5000	5800	6600	7400	8300	9100	9900	10700	12400	14000	16500	19800	23100	26400	29700	33000	40000	45000
Diameter of Boiler.....in.	48	48	48	54	54	54	60	60	60	60	66	66	72	72	78	78	84	84
Diameter Stack.....in.	20	20	20	22	22	22	24	24	26	26	28	30	32	32	34	34	38	40
Minimum Ht. Stack.....ft.	50	55	55	55	55	60	60	60	65	65	65	70	70	70	80	90	90	100

Type C Smokeless and Straight Draft

Compacted shape Boiler for restricted accommodations.

Number of Boiler.....	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770
Capacity, Steam...sq. ft.	2300	2900	3500	4000	4500	5000	5500	6000	7000	8000	9000	10500	12000	14000	16000	18000	20000	22000	25000	28000	32000
Capacity, Water...sq. ft.	3300	3900	4500	5000	5500	6000	6500	7000	8000	9000	10500	12000	14000	16000	18000	20000	22000	25000	28000	32000	36000
Width of Boiler.....in.	36	36	36	42	42	42	48	48	48	54	54	60	60	66	66	72	72	78	78	84	84
Length of Boiler.....in.	57	68	76	70½	78½	90	73	79	85	96½	103	96½	103	96½	107	115	130	118½	131	130	146½
Diameter Stack.....in.	20	20	20	22	22	22	24	24	26	26	28	30	30	32	32	34	34	38	38	40	40
Minimum Height Stack....ft.	50	50	50	55	55	55	60	60	60	65	65	65	70	70	70	80	90	90	90	100	100

Rated Capacity for Water Boiler is 60% Greater than Capacity of Steam Boiler.

Portable Type K Firebox Boiler for Smaller Buildings

No. 0K to 20K Up-draft capacity 600 to 13300 sq. ft.

Type "R" Residence Boiler

No. 740 to 748 for Coal, 370 to 1,960 Sq. Ft. Capacity

No. 1740 to 1748 for Oil, 450 to 2,380 Sq. Ft. Capacity

Separate Catalogs on Oil Burning Firebox Boilers—Power Boilers—Slim Type Radiation—
Steel Storage Tanks—Garbage Burners—Tabasco Hot Water Heaters

KEWANEE BOILER CORPORATION

Kewanee, Ill., Chicago, Ill., 1858 S. Western Ave., Phone Roosevelt 5800
Branches in principal cities of the United States

Electric Booster Pumps.

There are several types of electric booster pumps for hot water heating systems, low in cost and reliable in operation, which when added to such systems have accomplished remarkable results. They do not interfere with normal gravity circulation and may be controlled by thermostats in the pipes or in the rooms, so as to quickly and positively accelerate the distribution of heat.

Great Flexibility of Forced-Circulation Hot Water Heating.

Using these pumps, it is entirely practicable to heat rooms on a level with or below the boiler, with radiators conventionally and conveniently at the floor level; yet with the pipes which serve them all overhead or concealed, without any particular attention to pitch or drainage. In one large residence there is a central heating system for four major remote divisions, comprising residence, garage, chauffeur's home and butler's home; all heated from one large oil-burning boiler with hot water. Each division has accurate automatic temperature control, yet the oil burner does not cease applying heat until all four divisions are warm and will resume operation when any one of the four divisions, no matter which one, first requires heat.

Warm Air Heating Is Undergoing a Reformation.

WARM AIR HEATING has been maligned due to unintelligent installation and poor operation. In fundamental principle, of course, warm air heating is the old stove moved down cellar and connected to the rooms by ducts. A basic advantage with warm air is, of course, as with hot water,—that the heat output is directly proportional to the rate of fuel burning.

Some Buildings are Especially Adapted to Warm Air Heating.

The ordinary warm air plant installed in a compact symmetrical residence gives excellent results, even though installed in a slipshod way, since the distribution in such a building cannot go very far wrong. When there are uneven exposures, with rambling layout of rooms at varying levels, we are likely to find trouble, since we must carry the heat with air currents; and air currents are rather tricky.

A Discussion of Air Currents.

In general, the lighter warm air seeks the high places and will not come down unless we provide openings and some temptation for the cooler air to fall out of the lower and cooler regions. Many an ill warm air heating plant has been cured by judiciously-placed return-air registers which need not necessarily be closed while it pleases us to take in outside air. It is not necessary to use floor registers for inlets, with their attendant difficulties with carpets, rugs and furniture. Just as with hot water and with vapor, the heat-carrying ducts must be designed with attention to a pressure difference, which is necessary to secure circulation. Always a large volume of warm air rather than a small volume of very hot air should be attained. Whenever you cannot bear to hold your hand on the supply register there is something wrong about the air circulation, and this usually can easily be corrected.

Control of Warm Air Heating.

Automatic temperature control, gas and oil fuels and mechanical circulation-boosters are adapted to and are available with warm air heating.

When booster fans are used there is a very wide range of satisfaction attainable with

furnace heating; and many large and costly residences are now heated with fan furnace systems. The fan may be used constantly, or may be controlled by thermostats, just as are the booster pumps of hot water systems.

Introduction of Moisture.

The warm air plant is especially adaptable to economical humidity introduction, provided, however, that the water tanks shall be placed in the warm zone of the furnace chamber. When the tank is so placed, it is wise to provide an automatic water supply, since the evaporation is so rapid as to discourage consistent manual water-toting. It is easy to provide a tray or can which projects outside of the casing where a ball-cock can be provided with city water and an overflow, after the manner of a closet tank.

APARTMENT HOUSE HEATING.

The requirements for apartment house heating as to the rooms themselves do not differ from those in detached residences. We have, here, however, the approach to district heating.

Single-pipe Steam Heating Unsatisfactory.

Single-pipe steam heating for apartment houses, hotels and the like, is to be depreciated from standpoints of health and comfort and economy. The average flat-dweller finds the usual large single, single-pipe radiator much too powerful except in the coldest weather. He finds the single valve hard to reach—and few women can close it tightly enough to prevent noise, therefore,—up goes the window, let the radiator alone! Every time the janitor fires up—"hiss" goes the air valve!

Vapor Heating Is Recommended.

Vapor heating is inherently the present ideal for apartment house work. The supply valve can be adjusted to maintain exactly the heat needed for any outside condition,—there is no noise; yet when heat is wanted quickly, it is available instantly.

Automatic Temperature Control Suggested.

There is a decided tendency toward temperature control by zoning, in the larger buildings, either from manual control in the boiler room, of the pressure, which means temperature, in the heaters of each major building exposure, or by thermostats, sometimes out of doors, which control this pressure so as to supply just enough but not an over-amount of heat for each major building-exposure. The savings in fuel by these arrangements are almost fabulous, and the gains in comfort to the tenants, who are saved the constantly succeeding baking and chills due to single-pipe radiators and window manipulation, are very great.

Pumps Often Are Used with Vapor Heating.

It must be understood that in using the term "vapor heating" so far as the conditions within the radiators, pipes and boilers are concerned, we are not limited to gravity operation. Pumps which return the condensed water to the boilers and which may accentuate to any degree desired the pressure-drop through the radiators due to condensation, may be used and are used, without changing the general condition or classification of such systems. By the aid of pumps capable of maintaining a high differential-pressure between supply and return sides, with temperatures of vapor far below these corresponding with atmospheric steam pressure, the radiator heat may be balanced against the outdoor temperature; thus the windows may be kept closed and great savings in fuel will be accomplished.

Cut-away view of Morse-Boulger Destructor. Specially designed for every building and in any capacity from 62 lbs. per hour to 120 tons of garbage per day.



Provide for Garbage and Waste Material

NOW any building—from the bungalow to the palatial sky-towering hotel—can banish old fashioned methods of garbage and waste disposal by means of the Kernerator or Morse-Boulger Destructor. The cost is small; the gains large.

The Kernerator *should* be in the plans as only rarely can it be installed in an existing building. It consists of a basement combustion chamber built into the regular chimney, with hopper doors on floors above. Into these is dropped all waste—not only garbage, but papers, sweepings, tin cans, etc. The accumulation is air-dried by reason of the patented Kernerator By-Pass and occasional lighting reduces everything to ashes except metallic objects which are flame sterilized. **No fuel required.** Sizes to meet any condition. Built and guaranteed by the pioneers and inventors of flue-fed incineration.

The Morse-Boulger Destructor is most economically installed and most conveniently located when it is drawn into the plans, but can generally be built into existing buildings. Because it embodies the results of over 30 years' experience, exclusive three-way passage of hot gases and separate fuel grate, the M-B Destructor leadership is pronounced among hotels, apartment hotels, hospitals and public and private institutions. Only part of one man's time required to operate it. Uses coal, gas, oil or wood. The modern apartment hotel uses the Kernerator for apartment waste disposal and the M-B Destructor for destruction of all garbage and waste from main and private dining rooms.

For details see Sweet's, write or phone us for literature.

KERNER INCINERATOR CO.

MORSE-BOULGER DESTRUCTOR CO.

HUGH W. EWING, Branch Manager
612 North Michigan Avenue, Chicago, Ill.



Showing the Kernerator hopper door, flue and basement combustion chamber.

Residence models as low as \$95, and the masonry adds but little more when a regular chimney is used.

HEAVY-DUTY INCINERATION
MORSE-BOULGER
DESTRUCTORS

KERNERATOR
THE CHIMNEY-FED INCINERATOR

FACTORY HEATING.

Exhaust Steam Is Desirable for Heating Purposes.

Factory heating uses exhaust steam to a great extent. It is desirable and profitable always to generate as much power as will permit the exhaust steam thereof to be used in heating and in process work, even though electric energy may be procured at low rates.

The Steam May Be Used to Heat Water.

It is possible and very desirable to use hot water for heating large factories. With forced circulation hot water systems the most remote and difficult departments can be reached easily, and the water-temperature may be controlled at the boiler house proportionately to the weather. Exhaust steam can be condensed thus near the engine, without back-pressure; and its heat can be carried by the pumped water to remote places at little loss.

Furnaces Heat Many Factories.

Many large factories are heated by warm air furnaces using fans, to all intents and purposes being direct-fired unit heaters, and when oil or gas fuel is burned this method has much to commend it.

RECENT DEVELOPMENTS.

A Discussion of Some Remarkable Improvements.

UNIT HEATERS. The outstanding recent development in heating manufacturing buildings, garages, even stores, is the unit heater. This is a combination of an exceedingly efficient convactor; a heater which transfers the heat from steam or water or direct from fire to a current of air, with a mechanical device which drives the air rapidly over the heated surface. The amount of heat transferred per unit of area with such a combination, per unit of time, is increased many-fold over that transferred per unit of area by direct radiation. By the mechanical delivery and distribution of the warmed air, greatly increased over-all efficiency is obtained. For instance, in a lofty room, by ordinary hot air or radiator heating, the warmest air always seeks the highest places in the building.

A Tight, Warm Roof is Desirable.

If these high places are enclosed by a roof which is like a sieve as to heat-retaining ability, the fuel bill will be very high, and the floor will be very cold. This same room or building when heated by the modern mechanical unit heaters may have the floor warm and the ceiling comparatively cool; since the cool air is being drawn from the floor zone quickly, being heated a few degrees and then delivered back near the breathing zone, all so rapidly and positively that the warm air cannot bank up against the cold roof.

Unit Heaters Save Space.

A heater of this type will occupy perhaps one-tenth as much space as would the old radiators of equal capacity, and will have one supply pipe and one return pipe, compared with the maze of pipes, trenches, hangers and obstructions required by the older system. The unit heater will weigh much less and may be much less obtrusive than the radiators.

Progress and development in the unit heater industry is so rapid that great changes occur almost over-night, and conservative engineers predict that this combination of electric energy and heat from combustion of fuel will be used freely even in the finest living rooms of the next few years.

Some of the Troubles from Unit Heater Operation.

Some objections and some unfortunate installations have been encountered with unit heaters as is inevitable in any radical development in any art. The principal difficulties have been due to failure to remove the cold air from the floor, to failure to guard against noise and to improper control.

Air Currents with Unit Heaters.

Since cool air is heavier than warm air, it will be found near the floor in any heater room, and currents of cool air will flow downward along cold wall and glass surfaces. If there is no outlet for the cool air from the room and if the unit heater or radiator or stove, or any other kind of heater for that matter, is above the floor, the cool air just stays down below the heater and makes trouble. If the unit heater, placed overhead, has a fan of sufficient power to displace the cool air below it by the mechanical force of its delivered warm air, there may be drafts and noise. As a consequence, for buildings where drafts and noise are objectionable, there is a tendency to use floor-mounted units or to extend suction-ducts from overhead units down to the floor.

Control of Unit Heaters.

It is not wise to install electric fan-driven unit heaters with manual control alone, since the fans may deliver air after the heating medium has ceased to warm the air, causing trouble, and since the considerable heat from the convactor may bake out the insulation in the motor-windings if heat is left on when the fan is not running.

The Radiator in a Unit Heater is Called a Convactor

Very reliable automatic control is available and in common use to serve electrically operated unit heaters. This will first open the heat to the convactor by means of a motor valve whenever the room temperature drops below the desired degree. As soon as the heat reaches the convactor and has warmed it thoroughly so as to affect a secondary thermostat, this latter permits the electric current to start the fan; stopping the fan whenever the secondary thermostat gets cooler than the desired degree.

Unit Heaters may be used with Outside Air Supply.

This secondary thermostat also will open and close a cold air inlet from outside, via a motor-valve or a solenoid, if desired. When the room reaches the temperature desired, thermostat number one shuts off the heat supply; and as soon as thermostat number two gets cold, it caused the fan to stop and causes the cold air intake to close. While this automatic control involves some capital investment, it is exceedingly reliable and is eminently justified in view of the remarkable efficiency and great capacity of unit heaters.

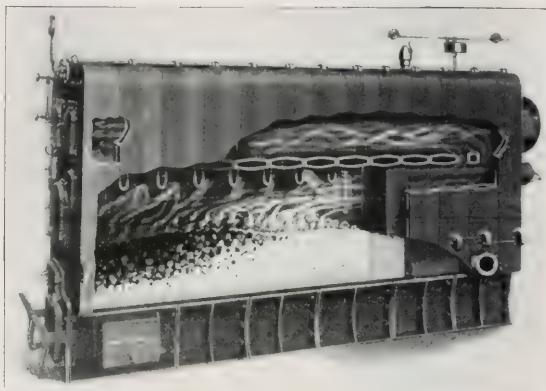
UNIT VENTILATING MACHINES. Unit ventilating machines are older than recirculating unit heaters, but when intelligently installed and when automatically controlled, are reliable and valuable instruments of service. They can be equipped with dust filters and are useful for many schools, public buildings and offices. The tendency seems to be to build these devices more compactly and to refine their appearance and control, so that they become handsome pieces of furniture, or are concealed within the building structure.

VENTILATION.

The Modern Concept of Ventilation.

Ventilation is always desirable in places of human occupancy. It is apparent that in so far as immediate and noticeable results are concerned, ventilation and comfort are synonymous; and that insidious chemical con-

Smokeless



Weil-McLain **SCIENTIFIC COMBUSTION** **BOILERS**

With Longer Smokeless Firing Periods

RECENT years have brought about many advances in the scientific combustion of fuel. Perhaps none is so important, however, to so many people as the smokeless burning of bituminous (soft) coals.

This company is pleased to place at the disposal of the public Weil-McLain Long-Firing-Period Smokeless Boilers. It is confidently believed that they will be acknowledged by heating authorities and laymen alike as the greatest advance yet made in smokeless boilers.

In these boilers Grate Vairea,* the principal cause for frequent firing, has been eliminated. Grate

Vairea, a condition found oftener in the ordinary smokeless boiler, causes fuel on one part of an area of grate to burn faster than upon another part.

The thick uniform bed of fuel in the Weil-McLain Smokeless Boiler burns evenly at all points. One firing lasts a longer period of time. One result is that the services of competent janitors or firemen are more easily retained and the problem of constantly hiring and training new men is practically eliminated.

Illustrated catalog giving full details concerning the Weil-McLain Smokeless, Long-Firing-Period Boiler sent on request.

WEIL-McLAIN COMPANY

General Offices
Chicago, Illinois

Boiler Factory
Michigan City, Indiana

Radiator Factory
Erie, Pennsylvania

*Our booklet on Grate Vairea—what it is and how it affects boiler firing periods and efficiency—will be gladly mailed on request.

stituents in air not affecting comfort and not indicated by discomfort are rare and of small importance, except in some industries where definite poisons are encountered. The human body has a delicate temperature adjustment, and air conditions which interpose over-work on this mechanism are unfortunate.

No one has as yet identified any definite toxic substance in respired air of normal concentration. Tests which are classical have proved that if a man is comfortable, with some air motion about his body, with not too great changes too suddenly in the air temperature and relative humidity, that man will not worry very much about how badly the air will smell to another man who enters from outside.

The Importance of Control in Ventilation.

The tendency in ventilation is to achieve control of temperature, humidity, air motion and air dust. Thus in a theatre, the air is dried by the only practicable method we have, which is to reduce its volume by the contraction inevitable from cooling it, by using refrigeration until each unit of air no longer can transport its normal moisture, but must lay that moisture down on some cool object; then having reached the dew point and having left the dew, the air is allowed to expand so that when it reaches the occupants of the theatre it is dry enough rapidly to evaporate the moisture from the bodies of the people, so that their bodily temperature-control is assisted in keeping them cool and comfortable and happy.

Dangers of Overheating.

When air which is warm and moist lies stagnant against the body of a man, moisture does not evaporate from his skin; he gets warm and uncomfortable; he begins to pant and eventually will suffer a heat stroke. It does not seem to matter at all whether the air from a theatre full of people is all recirculated indefinitely, provided it is reconditioned as to temperature and humidity. We must recognize, of course, that there is a great deal of leakage in any building and in all duct systems, which allows of a considerable air change despite the best intentions to prevent it.

Small Importance of Normal Chemical Constituents.

In ventilation of school classrooms the probable index to the requirement for volume of air delivery is in temperature control and comfort; certainly not in any at present recognizable chemical constituents of the air. During the heating season, the major problem in classroom is to prevent overheating; and enough controlled air must be circulated to provide for comfortable co-operation with the automatic regulating mechanism carried in the body of each occupant.

The Function of Moisture in Air.

In winter when the air is expanded by the heating apparatus and so is unusually ready to cool each person by a rapid rate of evaporation from his skin and from his mucous membrane, the introduction of artificial moisture is desirable. This easily is accomplished by the combination of warmed water with the air steam on its way to the room, either by means of a mist, as in a commercial air washer, or by means of steam or vapor. The moistened air in contact with the body evaporates the perspiration less rapidly than does dry air, causing slower removal of heat, permitting the body to be warmer and promoting comfort in a cooler temperature.

In manufacturing processes the mastery of humidity introduction and control has revolutionized many industries and has made every day a good day in such arts as spinning, weaving, printing, etc.

The Thermal Engineer.

The vocation of the heating engineer, it would seem, becomes blended with that of the refrigerating engineer, in the ultra-modern profession of thermal engineer.

Heating in Winter—Refrigeration in Summer.

The day rapidly is approaching when all housing will have year 'round temperature and comfort control—as important and indispensable to our descendants, throughout all seasons, as our ancestors found it for winter only. Many large offices and factories, all large theatres and places of assembly, nearly all modern banking houses and a few homes already have it.

Control of Dust in Air.

In most cities, where ventilating plants frequently are installed, outside air carries with it a considerable quantity of dust. Passing the air through a water spray and causing it to eddy around intentionally wetted obstructions removes some of the sand, cinders and grit but does not satisfactorily eliminate the soot particles.

Air Washers are Merely Heat Transfer Agencies.

Air washers, therefore, are being depended upon more and more as heat transfer agencies for cooling and de-humidifying; and for adding humidity to the air, and are being used less and less for cleaning the air.

Cleaning of Air is Done Better by Filters.

The air, it is found, can be cleaned of dust more effectively by passing it through filter-substances which have been coated with viscous material, after the manner of the mucous-coated hairs and sinuous passages of the nose. These filters are undergoing rapid evolution and improvement and the mechanically operated type will operate indefinitely with very little attention while removing a very large percentage of the dust from the air. With these machines the air can be cleaned at low temperatures, and with one of them in front of the humidifying machine it is possible to prevent clogging of the sprayheads and fouling of the circulating water for long periods.

Dust Filters are Effective Dust Watch-dogs.

Air filters of this type are always in circuit, preventing dust from lodgment in the ducts of a building; unlike the air washer of conventional type, which may be out of service at any time the pump motor fails to operate, and which then allows dust to enter the air ducts.

Dust Filters in Industry.

For air-cooling of the windings of large electric generators and motors, large quantities of air at high speed are required, and dusty air would clog quickly the minute air passages. The viscous dust filter very satisfactorily has solved this problem. It is used also for the intake air to internal combustion engines and to air compressors, with great savings in wear to closely gauged moving parts, since the abrasives in the air are retained by the filter.

CONTROL OF AIR DISTRIBUTION.

In All Ventilating Systems Control Is of Paramount Importance.

The fundamental consideration in all ventilating systems is that of air distribution. Ventilation cannot fairly be accomplished merely by delivering to a room a stated quantity of air. More and more attention is being paid to the distribution of the air so that it shall pass over all of the area which is to be benefited.

150 Pounds
Pressure



CRANE VALVES



250 Pounds
Pressure

Steam heat comes to the court house

Seventy-one years ago Mr. R. T. Crane directed the workmen as they poured metal into sand boxes. A short time before he had amplified his brass foundry business by venturing into the newly discovered field of steam warming. Already he had creditably filled several small contracts. Now he had been commissioned to devise a system for the new Cook County Court House. For this job the unsightly pipes and connections that were in general use would not do. Something more in keeping with the character of the building had to be evolved.

The molds were broken, and triumphantly Mr. Crane examined them. Before him in the sand a new fixture had taken form. Crude it would appear to our eyes, but in the molding of its fluted col-

umns, its reverse hook plates, and method of operation, it was undeniably a great step in advance towards modern radiators.

Not long after Mr. Crane ceased to actually install systems. Instead he devoted himself to perfecting the valves and fittings that have brought modern heating to so high a state.

Since then Crane Co. has been faced with many more problems. Vast institutions, skyscrapers, bungalows, and great factories, each contributed their engineering difficulties. How well Crane Co. overcame them is best understood by considering that in so great a majority of the huge buildings of today, and in many of the homes, Crane valves and fittings contribute to the effectiveness of the heating plants.

CRANE

PLUMBING AND HEATING MATERIALS

GENERAL OFFICES: CRANE BUILDING, 836 S. MICHIGAN AVENUE, CHICAGO

NEW YORK OFFICE: 23 W. 44TH STREET

Branches and Sales Offices in One Hundred and Eighty Cities

Some Systems for Distribution of Air Supply.

There is a tendency toward downward distribution with air cooling systems, especially since in no other way has it generally been possible to introduce the air without drafts. In school rooms, introduction of the air downward from several ceiling grilles or from ceiling slots, or delivery of the air upward along the outer walls, or through the window stools, gives good results; an optimum condition thus being attainable with smaller volumes of air than with conventional side-wall air introduction. In large areas, such as general offices, the best results are attained with introduction of the air to at least every bay, say not over four hundred square feet to an outlet—the air being sprayed out horizontally or at an angle from the center of each such area, or entering through more or less continuous slots along each of two opposite sides.

Air Exhaust Systems.

The exhaust ventilation of toilet and locker rooms in any building is of great importance, and should, wherever power is available, always be done by positive mechanical means. Where recirculation of the bulk of the air is in effect the withdrawals by such exhaust fans will cause a reasonable and gradual air renewal for the whole system.

The Planning of a Kitchen.

Kitchens always should have separate exhaust fans exclusively for removal of heat and odors, and it is highly desirable that large kitchens should **not** have any windows; the inevitable unauthorized opening of which always short-circuits and upsets the adequate distribution of the designed ventilation. Thus an open window in many a kitchen when to windward, admits more air than the exhaust fan can handle, causing the excess air-pressure in the kitchen to back-up into the balance of the building, and advertising by odors and heat the presence of the kitchen and the failure of the ventilating plant provided for it.

HOME INSULATION.

A New Industry of Vital Interest to Builders.

It is comparatively easy for the thermal engineer to create comfortable conditions and conditions favorable to manufacturing processes in buildings which have construction which is resistant to too-rapid heat transfer. A well built frame house with dry lumber having small confined wall-air-spaces always has been easy to heat in winter, yet is cool in summer. An old stone house without damp-proofing, with its thick walls constantly evaporating ground moisture carried up in them by capillary action, always has been cool in warm weather and very hard to heat in winter. In this day the enlightened builder of houses provides against undue heat transfer by using building insulation, and by taking care to seal the porous walls and the cracks against air infiltration. In many cases, the saving in first cost of a residence by use of building-insulation will pay the cost of the insulation, netting the occupant reduced fuel costs and greatly improved year 'round comfort. Definite credits against fuel costs have been worked out by the manufacturers of insulating materials; and information and materials are available by anyone upon request.

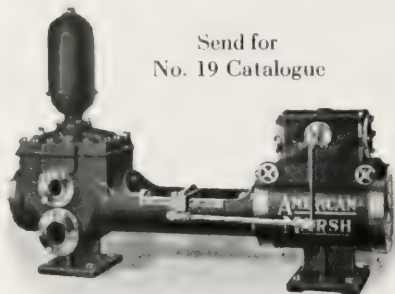
Insulation for buildings is available in quilt form and in board form and in porous-fill form, and no building should be without it.

Provisions Against Air Infiltration.

Remarkable improvements have been made and are commercially available in compounds for sealing air-leaky walls, and there are many satisfactory and permanent types of weather strips for windows and doors.

AMERICAN-MARSH

Send for
No. 19 Catalogue



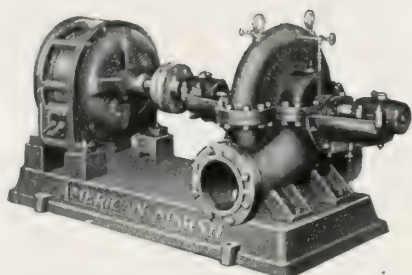
**Steam and Power
Pumps**

**Centrifugal
Pumps**

Air Compressors

**Condensation
Heating Pumps**

**Vacuum
Heating Pumps**



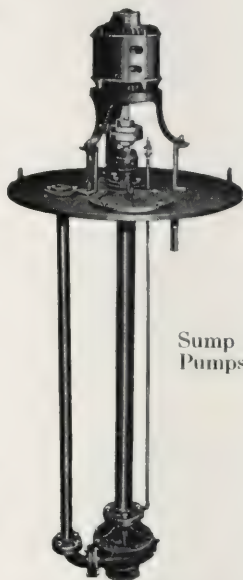
**AMERICAN
STEAM PUMP
COMPANY**

J. M. STANNARD, Mgr.

CHICAGO

923-928 Monadnock

Tel. Harrison 1501



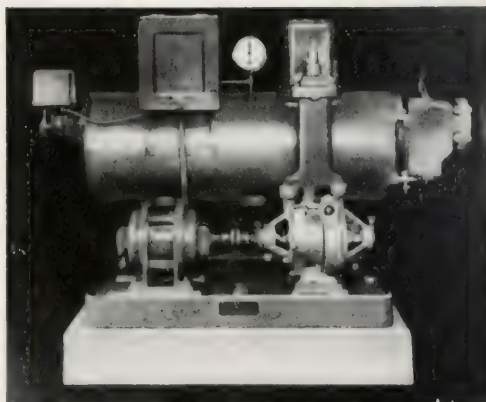
Sump
Pumps



The Jennings-Nash Vacuum Heating Pump

THESE are complete vacuum and low pressure boiler feed pumping units. They are compact, silent, and operate on little power. Units are long-lived, as there are no contacting points inside the pump casting.

Thousands of the largest and best office buildings, hotels, institutions, schools and manufacturing plants are fitted up with the Jennings-Nash Heating Units.



STANNARD POWER EQUIPMENT CO.

923-928 MONADNOCK BLOCK Telephone: Harrison 1501 CHICAGO, ILL.

Use the Best and Avoid Trouble

CHICAGO MASTER STEAM FITTERS' ASSOCIATION STANDARDS

For Computing Boiler Sizes and Radiation Quantities for Buildings of Average Construction.

RULE FOR COMPUTING RADIATOR QUANTITIES FOR HEATING PLANTS.

The following are rules compiled and recommended by the Chicago Masters Steam Fitters' Association. However, they should not control against the best judgment of the competent designing engineer.

Factors for Multiplying Square Feet of Surface or Lineal Feet of Crack, to Figure Square Feet of Cast Iron Steam Radiation Required for Heating to 70°.

	Glass	Infiltration	Outside Walls	Roofs	Ceilings	Basement Floors	Interm. Floors	Cold Partitions
Glass—								
Single .....	.293							
Double or Storm .....	.147							
Sky-Light .....	.346							
Infiltration, Stationary—								
Sash .....	.293	.12						
Double Hung Wood or Steel Sash .....	.293	.24						
Casement-Winds .....	.293	.48						
Outside or French Doors .....	.293	.48						
Transoms .....	.293	.48						
Outside Door With Inner Vest. Door .....	.293	.48						
Store Doors .....	.293	.96						
Outside Walls—								
8" Plain Brick .....			.111					
12" Plain Brick .....			.085					
16" Plain Brick .....			.069					
8" Brick and Plaster .....			.10					
12" Brick and Plaster .....			.077					
16" Brick and Plaster .....			.067					
8" Brick Fur Lath and Plaster .....			.072					
12" Brick Fur Lath and Plaster .....			.062					
16" Brick Fur Lath and Plaster .....			.056					
4" Brick, 4" Tile and Plaster .....			.08					
8" Brick, 4" Tile and Plaster .....			.069					
12" Brick, 4" Tile and Plaster .....			.059					
8" Plain Concrete .....			.16					
12" Plain Concrete .....			.14					
16" Plain Concrete .....			.109					
8" Concrete Fur Lath and Plaster .....			.133					
12" Concrete Fur Lath and Plaster .....			.107					
16" Concrete Fur Lath and Plaster .....			.091					
Frame Studding .....			.064					
Frame No Sheathing .....			.082					
Frame On Lath and Plaster .....			.093					
Roofs—								
Tar and Gravel on 1" Boards .....				.08				
Tar and Gravel on 4" Concrete .....				.16				
Shingle on Sheathing .....				.106				
Shingle Sheathing, Lath and Plaster .....				.08				
Basement Floors—								
Concrete on Earth .....						.041		
Wood on Sleepers .....						.017		
Intermediate Floors—								
4" Concrete .....							.026	
4" Concrete, 3" Fill, 1" Fin. ....							.02	
Double Wood .....							.026	
Ceilings—								
Lath and Plaster .....					.065			
Lath and Plaster Wood Floor Over .....					.037			
Cold Partitions Stud. L. and P. 1 Side .....								.08
Cold Partitions Stud. L. & P. 2 Sides .....								.044

The Dunham Differential Vacuum Heating System

A CLEAR conception of the underlying principle is necessary in order to obtain the best results possible. The engineer should know what the Dunham Differential Vacuum Heating System really is, in order to take full advantage of its possibilities. The system uses steam as a heating medium. This steam is supplied from the boiler direct or through controlled valves to the radiators at variable temperatures from 133 degrees up to 212 degrees or higher if required. By furnishing steam at this wide range of temperatures it is possible to vary the heat output of the radiation thus preventing overheating. For instance, in mild weather, steam is supplied at a low temperature, therefore the radiator will give off only a slight amount of heat (in fact one can hold his hand on the radiator). As the weather gets colder higher temperature steam is furnished until finally in severe weather there may be a pressure on the radiation instead of the high vacuum used in mild weather.

The temperature of the steam is governed by the Dunham control equipment and the Dunham Differential Vacuum Pump, which removes the air from the system thereby reducing the pressure on the water in the boiler, or causing the steam to expand through Reducing Valves when they are used.

This system is simple, easy to design and install and very economical in operation. It affords a solution of the problem of preventing waste of fuel through overheating of buildings,

including loss from excessive window ventilation in mild weather when only a minimum amount of heat is required.

Mild weather constitutes approximately 95 per cent of the heating season in most localities.

Past experience indicates that this system will effect a fuel saving of 25 per cent or more compared with previous types of steam heating systems.

The Dunham Differential Vacuum Heating System fully meets all needs of a climate where variations in temperature occur during the heating season.

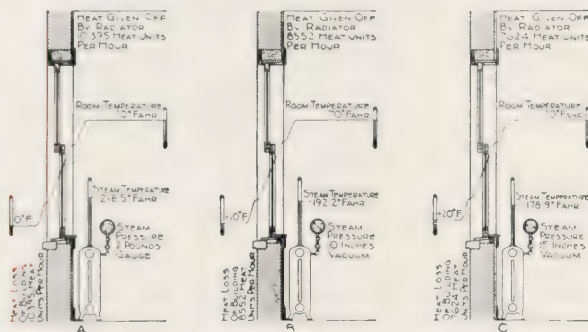


Fig. 1

Heat Control. This illustration shows how the room temperature is maintained uniformly under changing weather conditions, by varying the steam pressure so that the heat given off by the radiator equals the heat lost by the building.

Dunham Zone Temperature Control

This control enables the engineer to know temperature conditions in the building and to regulate by zones the temperature on various parts of the structure.

Its use with the Dunham Differential Vacuum Heating System establishes the heat emission to the building by providing sub-atmospheric pressures and the correct distribution necessary to balance the weather changes which occur daily and sometimes from hour to hour.

It provides the flexibility which yields the economies and comfort inherent in this revolutionary development in steam heating.

It is simple, compact, easily installed and operated.

C. A. DUNHAM CO.

450 East Ohio Street

CHICAGO

Over eighty sales offices in the United States, Canada and the United Kingdom bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city. An engineer will consult with you on any project.



The Dunham Differential Vacuum Heating System and individual parts of the apparatus used in that system are fully tested by United States Patents Nos. 1,674,111, 1,706,391, and 1,727,365 and Canadian Patents Nos. 282,193, 282,194 and 282,195. Additional patents in the United States, Canada and foreign countries are now pending.

FULL AREA OF TWO-PANE WINDOWS GIVING THE TOTAL AREA OF TWO-PANE WINDOWS, BRICK OPENING.

Height of Glass Width of Glass	16"	18"	20"	22"	24"	26"	28"	30"	32"	34"	36"	38"	40"
TOTAL AREA IN SQUARE FEET													
12"	5.9	6.4	7.	7.5	8.	8.6	9.2	9.8	10.2	10.9	11.4	12.	12.5
14"	6.5	7.1	7.7	8.3	9.	9.6	10.2	10.8	11.4	12.	12.6	13.2	13.8
16"	7.	7.7	.4	9.1	9.8	10.5	11.2	11.9	12.6	13.3	14.	14.4	15.
18"	7.6	8.4	9.1	9.8	10.5	11.2	12.	12.7	13.	14.1	14.8	15.6	16.3
20"	8.2	9.	9.8	10.5	11.3	12.1	12.9	13.7	14.5	15.2	16.	16.8	17.5
22"	8.8	9.6	10.4	11.2	12.1	13.	13.8	14.6	15.4	16.2	17.	17.8	18.8
24"	9.4	10.3	11.1	12.	12.9	13.8	14.7	15.6	16.5	17.4	18.3	19.2	20.
26"	10.	10.9	11.8	12.7	13.7	14.7	15.6	16.6	17.5	18.5	19.4	20.4	21.3
27½"	10.4	11.4	12.5	13.4	14.3	15.3	16.3	17.3	18.3	19.3	20.3	21.3	22.2
28"	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5
30"	11.1	12.2	13.2	14.3	15.4	16.4	17.5	18.5	19.6	20.6	21.7	22.7	23.8
32"	11.7	12.8	13.9	15.	16.1	17.2	18.4	19.5	20.9	21.7	22.8	23.9	25.
34"	12.3	13.5	14.6	15.8	17.	18.1	19.3	20.5	21.6	22.9	24.	25.2	26.3
36"	12.9	14.1	15.3	16.5	17.8	19.	20.9	21.4	22.7	23.9	25.1	26.3	27.5
38"	13.5	14.7	16.	17.3	18.6	19.9	21.1	22.4	23.7	25.	26.2	27.5	28.9
40"	14.	15.4	16.7	18.	19.4	20.7	21.6	23.4	24.7	26.	27.4	28.7	30.
44"	15.2	16.7	18.1	19.5	21.	22.4	23.9	25.3	26.8	28.2	29.7	31.1	32.5
48"	16.4	17.9	19.5	21.	22.6	24.2	25.7	27.3	28.8	30.4	31.9	33.5	35.

Sizes not shown, figure brick opening.

SIZES OF LOW PRESSURE STEAM MAINS ONE PIPE CIRCUIT SYSTEM DRIPPED AT END

1" up to 60 sq. ft.	
1¼" 60 sq. ft. to 100 sq. ft.	
1½" 100 sq. ft. to 200 sq. ft.	
2" 200 sq. ft. to 400 sq. ft.	
2½" 400 sq. ft. to 600 sq. ft.	
3" 600 sq. ft. to 900 sq. ft.	
3½" 900 sq. ft. to 1,400 sq. ft.	
4" 1,400 sq. ft. to 2,000 sq. ft.	
4½" 2,000 sq. ft. to 2,600 sq. ft.	
5" 2,600 sq. ft. to 3,300 sq. ft.	
6" 3,300 sq. ft. to 4,500 sq. ft.	
7" 4,500 sq. ft. to 7,000 sq. ft.	
8" 7,000 sq. ft. to 9,000 sq. ft.	
9" 9,000 sq. ft. to 11,000 sq. ft.	
10" 11,000 sq. ft. to 15,000 sq. ft.	
12" 15,000 sq. ft. to 24,000 sq. ft.	

On all piping, proper provision shall be made for expansion and contraction.

All piping shall be properly pitched.

Supply mains shall not be reduced more than one size larger than one-half the diameter of the largest main.

Dry returns shall be not less than one-half the diameter of the supply.

Wet returns may be one size smaller than one-half the diameter of the supply pipe. By supply pipe is meant the size of main at the point of leaving boiler.

All horizontal branches more than 16 feet in length shall be properly dripped.

Supply mains shall not be reduced more than one-half the diameter of the largest main.

Dry returns shall be not less than one-half the diameter of the supply.

Wet returns may be one size smaller than one-half the diameter of the supply pipe. By supply pipe is meant the size of the main at the point of leaving boiler.

PIPE SIZES FOR UP-FEED RISERS

1" 30 square feet or under.
1¼" 30 to 60 square feet
1½" 60 to 100 square feet
2" 100 to 200 square feet
2½" 200 to 350 square feet
3" 350 to 900 square feet
3½" 900 to 1,200 square feet
4" 1,200 to 2,000 square feet

RADIATOR CONNECTIONS

Up to and including 30 square feet.....1"

Above 30 and including 60 square feet..1¼"

Above 60 and including 100 square feet..1½"

Above 100 square feet.....2"

PIPE SIZES FOR ARMS TO RADIATORS AND BRANCHES TO UPFEED RISERS

1" up to and including 20 square feet.

1¼"— 21 and including 40 square feet.

1½"— 41 and including 80 square feet.

2"— 81 and including 150 square feet.

2½"— 151 and including 275 square feet.

3"— 276 and including 625 square feet.

3½"— 626 and including 1,050 square feet.

4"—1,051 and including 1,600 square feet.

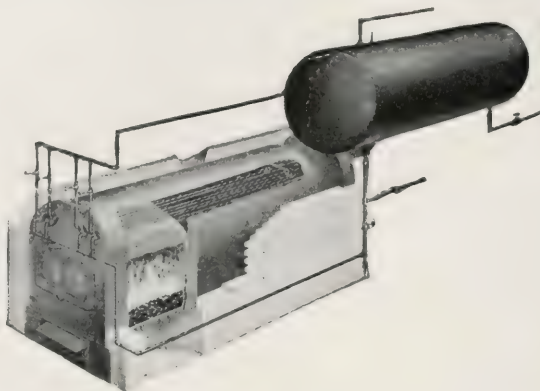
All horizontal branches or arms more than 8 feet in length and not over 12 feet in length shall be increased one size larger than given above.

All horizontal branches or arms more than 12 feet in length and not over 16 feet in length shall be increased two sizes larger than given above.

A New Factor in Building Valuations

It is felt that there is need for a new viewpoint in building valuation. In the past it would seem that too much stress has been placed on age and immediate revenue in building valuation. It would seem that the architect, owing to his peculiar training, is in a position to point out other very important factors entering into value make-up, which have not heretofore been considered in this locality; such as, balance of structural design, adaptability to purposes intended, character of construction as influencing cost of up-keep.

Feeling that the stability of building investment can be better assured by taking the before mentioned factors into consideration, the Illinois Society of Architects has appointed a Building Valuation Committee to furnish the public with competent architectural valuation service. This Committee should form a real asset to the community,



To architects who sincerely wish their clients well:

H. G. WELLS sums up the final test of anything from a mousetrap to a social system, in the question "Does it work?"

You, as an architect, bend your ingenuity toward giving your clients buildings *that will work*. The recommendation of appurtenances which contribute good service to tenants is up to you.

Hot water is furnished by the B S T *Submerged Water Heating System* during all hours of the twenty-four, at negligible cost in winter, and in summer at about half the cost of maintaining a separately-fired water heater. Several hundreds of these systems installed here in Chicago at the recommendation of well-known architects are proof in themselves that *it will work*.

A brochure, *Cutting the Cost of Hot Water*, contains photographs of actual installations and explains the operating details of the system. A copy will be sent for the asking.



Best System
Today

Ferguson & Lange Foundry Company
1039 Willow Street, Chicago

The B S T Submerged Water Heating System is fully covered by patents in the United States and Canada. Other patents pending.

· **B · S · T ·**

The First *Submerged* Water Heating System

RULES FOR COMPUTING NET BOILER LOADS FOR EQUIVALENT DIRECT CAST IRON COLUMN RADIATION

Copyright 1928, by Heating and Piping Contractors' National Association.

Direct Cast Iron Radiation

It is assumed that Direct Cast Iron Column Radiation will emit 225 B. T. U. per hour per square foot of surface for steam, and 150 B. T. U. per hour per square foot of surface for water, therefore all radiation must be reduced to this heat emission basis.

Rule for Computing Net Boiler Loads for Other Than Cast Iron Column Radiation

Reduce to equivalent cast iron column radiation by adding 25% to pipe coils or cast iron wall radiators on side walls and direct-indirect radiation, and 50% to indirect radiation without fan.

Rule for Computing Net Boiler Loads for Lower Inside Temperatures Than 70° F.

If building is to be heated to less than 70° multiply the equivalent net C. I. column radiation load by the following factors for proper net boiler load:

	Steam	Water
70°	1.	1.
65°	1.03	1.03
60°	1.07	1.07
55°	1.10	1.10
50°	1.13	1.13
45°	1.17	1.17
40°	1.20	1.20

Rule for Computing Boiler Size for Hot Blast Coils

For computing boiler size to be used for Hot Blast Coils use manufacturers' condensation chart and figure .375 lb. of condensation per hour as equivalent to one square foot of direct column radiation.

Rules for Computing Boiler Size for Unit Heaters

For boiler size to be used on unit heater for recirculating air, base unit heater on amount of equivalent direct radiation required.

Rule for Computing Boiler Size for Heating Water for Domestic Use

When water for domestic use is heated by heating boiler, by means of coil in firebox or steam coil in storage tank, size of boiler should be increased, figuring each gallon of water tank capacity as equivalent to two square feet of steam radiation or three square feet of hot water radiation.

For example, a 160-gallon tank should be figured as equivalent to 320 square feet of steam radiation or 480 square feet of hot water radiation.

When water for domestic use is heated by submerged heater with storage tank figure each gallon tank capacity as equivalent to one-half square foot of direct radiation.

For submerged heaters without storage tank, size of boiler to be increased as follows: For each gallon of water to be heated per hour add four square feet of direct radiation.

Rule for Computing Net C. I. Column Radiation Equivalent Load for Boilers Selected from Net Load Chart

EXAMPLE—

- (1) 500 sq. ft. of direct cast iron column radiation in room to be heated to 70° F.
- (2) 500 sq. ft. of direct cast iron column radiation in room to be heated to 50° F.
- (3) 500 sq. ft. of cast iron wall radiation or wall pipe coils in room to be heated to 50° F.
- (4) 500 sq. ft. of gravity indirect radiation.
- (5) 500 sq. ft. of direct-indirect radiation.
- (6) 250-gal. hot water tank. Water to be heated with steam coil.
- (7) 500 sq. ft. of cast iron hot blast radiation, having a condensation rate of 1.92 lbs. of steam per hour per sq. ft. with incoming air at —10° F.

SOLUTION—

- (1) 500 sq. ft. x 1.0..... 500 sq. ft.
- (2) 500 sq. ft. x 1.13..... 565 " "
- (3) 500 sq. ft. x 1.25x1.13..... 707 " "
- (4) 500 sq. ft. x 1.5..... 750 " "
- (5) 500 sq. ft. x 1.25..... 625 " "
- (6) 250 gal. x 2..... 500 " "
- (7) (500x1.92) divided by .375..... 2560 " "

C. I. column radiation equivalent load6207 sq. ft.

CHIMNEYS

Due to the wide variation in boiler design, the length and nature of the gas passage, the nature of the fuel burned and the rate of combustion all of which affects directly the draft pressure required, it is recommended that the chimney sizes given by the various manufacturers for their boilers be used for both round and square sectional cast iron boilers. It is advisable that chimney have approximately 25 per cent excess area of smoke collar on the boiler.

A poor draft means imperfect combustion, therefore it is highly important that all boilers be attached to chimneys providing sufficient draft to consume with proper combustion the required amount of fuel per hour.

It is also important that the chimney be so located with reference to adjacent buildings or objects nearby that draft will not be interfered with.

Round flues will give a better draft than a square or other rectangular shape, having the same cross-sectional area. Round flues are recommended where it is practical to obtain them.

To secure the most satisfactory draft conditions, the area and the height of a chimney must be proportioned to the size and character of heating appliance attached to it and all flue chimney connections made perfectly tight.

RECOMMENDATIONS

It is recommended that no boiler be installed having a grate longer than 72 inches.

Also that in all installations of steam boiler that drain valves be placed on the returns and that the condensation from such returns be discharged into the sewer for a period of from three days to one week after starting fire, thereby clearing system of grease and dirt. At the end of this period boiler should be thoroughly washed and blown out.

For net loads for boilers communicate with the Chicago Master Steam Fitters' Association. Phone Franklin 6280—228 N. La Salle Street.

Beauty...Efficiency...Undivided Responsibility



American Radiator Heating Equipment for Every Requirement

No man, buying an automobile, purchases a certain make of carburetor, a certain make of radiator and so on, and has his car assembled. He buys a car the parts of which are designed to function as an efficient unit.

In the past, however, such has been the custom in the purchase of heating. A boiler from this company, radiators from that, valves from a third. No wonder there are often imperfect coordination among the parts.

Conscious of the need for undivided responsibility, the American Radiator Company has made it possible, by its complete line of products, to buy every part of a

heating system from one manufacturer. It guarantees the heating plant in its entirety.

The success of a heating system depends largely on its accessories. The best boiler and radiators may be handicapped by inferior valves. For this reason it is important that accessories be used which have been made especially for a particular radiator, and designed to play their part in the development of the highest efficiency for the whole plant.

To its guarantee of undivided responsibility, American Radiator Heating Equipment adds the efficiency developed through forty years' experience—and great beauty and distinction in line and color.

AMERICAN RADIATOR COMPANY

816 SO. MICHIGAN AVE., CHICAGO, ILL.

TABLE OF COMPARATIVE RATINGS AS COMPILED BY THE CHICAGO MASTER STEAMFITTERS ASSOCIATION
RADIATION LOAD

Key	FACTOR OF SAFETY OVER RADIATION LOAD																														
	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300	2400	2500	2600	2700	2800	2900	3000	3100	3200	3300	3400	3500	3600	3700	3800	3900	
1	250	250	250	249	249	249	248	248	248	248	247	247	247	247	246	246	246	245	245	245	244	244	244	244	244	243	243	243	243	242	242
2	235	235	235	234	234	233	233	233	233	233	232	232	232	232	231	231	231	230	230	230	229	229	229	229	228	228	228	228	228	227	227
3	220	220	220	219	219	218	218	218	218	218	217	217	217	217	216	216	216	215	215	215	214	214	214	214	213	213	213	213	212	212	212
4	205	205	205	204	204	203	203	203	203	203	202	202	202	202	201	201	201	200	200	200	199	199	199	199	198	198	198	198	197	197	197
5	195	195	195	194	194	193	193	193	193	193	192	192	192	192	191	191	191	190	190	190	189	189	189	189	188	188	188	188	187	187	187
6	185	185	185	184	184	183	183	183	183	183	182	182	182	182	181	181	181	180	180	180	179	179	179	179	178	178	178	178	177	177	177
7	175	175	175	174	174	173	173	173	173	173	172	172	172	172	171	171	171	170	170	170	169	169	169	169	168	168	168	168	167	167	167
8	165	165	165	164	164	163	163	163	163	163	162	162	162	162	161	161	161	160	160	160	159	159	159	159	158	158	158	158	157	157	157
9	165	165	165	164	164	163	163	163	163	162	159	156	153	150	147	144	141	138	135	132	129	126	123	120	117	114	111	109	106	104	104
10	155	155	155	154	154	153	153	153	153	152	152	152	152	151	151	151	150	150	150	149	149	149	149	148	148	148	148	147	147	147	147
11	155	155	154	153	152	152	151	150	149	149	148	147	146	146	145	144	143	143	142	141	140	140	140	139	138	137	136	135	134	134	134
12	145	145	145	144	144	144	143	143	143	143	142	142	142	142	141	141	141	140	140	140	139	139	139	139	138	138	138	138	137	137	137
13	135	135	135	134	134	134	133	133	133	133	132	132	132	132	131	131	131	130	130	130	129	129	129	129	128	128	128	128	127	127	127
14	125	125	125	124	124	124	123	123	123	123	122	122	122	122	121	121	121	120	120	120	119	119	119	119	118	118	118	118	117	117	117
15	115	115	115	114	114	114	113	113	113	113	112	112	112	112	111	111	111	110	110	110	109	109	109	109	108	108	108	108	107	107	107
16	105	105	105	104	104	104	103	103	103	103	102	102	102	102	101	101	101	100	100	100	99	98	98	98	97	97	97	97	96	96	96
17	100	99.5	99	98.5	98.3	98	97.5	97	96.5	96.3	95.8	95.3	95	94.5	94	93.8	93.3	92.8	92.5	92	91.5	91.3	90.8	90.3	90	89.5	89	88.7	88.3	87.8	87.8
18	90	89.3	89	88.2	87.8	87.1	86.6	86	85.4	84.8	84.2	83.8	83.2	82.8	82	81.6	81	80.3	79.8	79.2	78.8	78	77.5	77	76.5	75.9	75.2	74.8	74.1	74.6	74.6
19	85	84.8	84.5	84.2	84	83.8	83.5	83.2	83	82.8	82.5	82.2	82	81.8	81.5	81.2	81	80.8	80.5	80.2	80	79.8	79.5	79.2	79	78.8	78.5	78.2	78	77.8	77.8
20	80	79.8	79.6	79.4	79	78.5	78.3	77.9	77.5	77.3	77	76.8	76.3	76	75.8	75.3	75	74.8	74.5	74.3	73.8	73.5	73.3	72.9	72.5	72.3	72	71.7	71.3	71	71
21	75	74.8	74.5	74.2	74	73.9	73.7	73.4	73.2	73	72.9	72.6	72.3	72.1	72	71.8	71.6	71.2	71	70.8	70.6	70.4	70.2	70	69.8	69.6	69.4	69.2	69	68.8	68.8
22	70	69.8	69.5	69.2	69	68.9	68.7	68.4	68.2	68	67.9	67.6	67.3	67.1	67	66.8	66.6	66.2	66	65.8	65.6	65.4	65.2	65	64.8	64.6	64.4	64.2	64	63.8	63.8
23	65	64.5	64	63.8	63.3	63	62.8	62.3	61.9	61.5	61	60.8	60.3	60	59.7	59.2	59	58.5	58	57.8	57.5	57	56.8	56.3	56	55.5	55	54.8	54.3	54	54
24	60	59.7	59.2	59	58.7	58.2	58	57.7	57.3	57	56.8	56.5	56	55.7	55.4	55	54.8	54.4	54	53.8	53.3	53	52.9	52.5	52.3	52	51.7	51.3	51	50.7	50.7
25	55	54.7	54.2	54	53.8	53.5	53.2	53	52.8	52.3	52	51.8	51.6	51.2	51	50.8	50.3	50.1	50	49.7	49.2	49	48.8	48.5	48.2	48	47.8	47.3	47.1	47	47
26	50	49.7	49.2	49	48.8	48.5	48.2	48	47.8	47.3	47	46.8	46.6	46.2	46	45.8	45.3	45.1	45	44.7	44.2	44	43.8	43.5	43.2	43	42.8	42.3	42.1	42	42
27	45	44.7	44.2	44	43.8	43.5	43.2	43	42.8	42.3	42	41.8	41.6	41.2	41	40.8	40.3	40.1	40	39.7	39.2	39	38.8	38.5	38.2	38	37.8	37.3	37.1	37	37
28	40	39.7	39.2	39	38.8	38.5	38.2	38	37.8	37.3	37	36.8	36.6	36.2	36	35.8	35.3	35.1	35	34.7	34.2	34	33.8	33.5	33.2	33	32.8	32.3	32.1	32	32
29	35	34.7	34.2	34	33.8	33.5	33.2	33	32.8	32.3	32	31.8	31.6	31.2	31	30.8	30.3	30.1	30	29.7	29.2	29	28.8	28.5	28.2	28	27.8	27.3	27.1	27	27
30	30	29.7	29.3	29	28.6	28.2	28	27.6	27.3	27	26.6	26.1	25.9	25.6	25.3	25	24.7	24.2	24	23.6	23.3	23	22.7	22.3	22	21.7	21.3	21	20.7	20.3	20.3

YOUNG UNIT HEATERS

YOUNG UNIT Heaters are distinguished by certain refinements which make for sturdier construction, less weight, less vibration, quieter operation, and the delivery of greater volume of "useful" heated air at low power cost. They are designed to occupy the minimum space. The condenser is all-copper, heavy-duty construction, with straight, tapering, self-cleaning fins—an important feature tending to continued high efficiency.



The condenser is readily removable for cleaning. Full allowance is made for expansion and contraction by slotted holes in the side plates. Young Units up to a capacity of 800 feet of radiation need no other support than the steam main.

*We are equipped to render prompt and comprehensive cooperation
in all types of heating problems.*

YOUNG RADIATOR COMPANY

Manufacturers of High Grade Heating Units

No. 6 North Michigan Ave., CHICAGO Phone CENTral 7805

Factory—Racine, Wisconsin

Built for Endurance
and Maximum
Performance



UNIT HEATERS

Reg. U. S. Pat. Off.

Representatives
in Principal
Cities

© Y R Co.

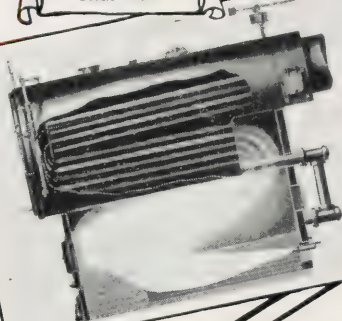
Key	FACTOR OF SAFETY OVER RADIATION LOAD																															
	4000	4100	4200	4300	4400	4500	4600	4700	4800	4900	5000	5100	5200	5300	5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400	6500	6600	6700	6800	6900		
1	242	241	241	241	240	240	240	239	239	239	239	238	238	238	237	237	237	236	236	236	236	235	235	235	234	234	234	234	234	234	233	
2	227	226	226	226	225	225	225	224	224	224	224	223	223	223	222	222	222	221	221	221	221	220	220	220	220	220	220	220	220	220	218	
3	212	211	211	211	210	210	210	209	209	209	209	208	208	208	208	207	207	207	206	206	206	206	205	205	205	205	205	205	205	205	204	
4	197	196	196	196	195	195	195	194	194	194	194	193	193	193	193	192	192	192	191	191	191	191	190	190	190	190	190	190	189	189	188	
5	187	186	186	186	185	185	185	184	184	184	184	183	183	183	183	182	182	182	181	181	181	181	180	180	180	180	180	180	179	179	178	
6	177	176	176	176	175	175	175	174	174	174	174	173	173	173	173	172	172	172	171	171	171	171	170	170	170	170	170	169	169	169	168	
7	167	166	166	166	165	165	165	164	164	164	164	163	163	163	163	162	162	162	161	161	161	161	160	160	160	160	160	159	159	159	158	
8	157	156	156	156	155	155	155	154	154	154	154	153	153	153	153	152	152	152	151	151	151	151	150	150	150	150	150	149	149	149	148	
9	102	99	97	94	92	89	887	885	885	883	882	881	88	878	876	875	873	871	87	869	867	866	865	863	861	86	859	858	856	855	855	
10	147	146	146	146	145	145	145	144	144	144	144	143	143	143	143	142	142	142	141	141	141	141	140	140	140	140	140	139	139	139	138	
11	133	132	131	131	130	129	127	127	127	126	125	125	124	123	122	122	121	120	119	119	118	117	116	116	115	115	114	114	113	112	111	111
12	137	136	136	136	135	135	135	134	134	134	134	133	133	133	133	132	132	132	131	131	131	131	130	130	130	130	130	129	129	129	128	128
13	127	126	126	126	125	125	125	124	124	124	124	123	123	123	123	122	122	122	121	121	121	121	120	120	120	120	120	119	119	119	118	118
14	117	116	116	116	115	115	115	114	114	114	114	113	113	113	113	112	112	112	111	111	111	111	110	110	110	110	110	109	109	109	108	108
15	107	106	106	106	105	105	105	104	104	104	104	103	103	103	103	102	102	102	101	101	101	101	100	100	100	100	998	986	982	98	98	
16	964	96	958	956	952	95	948	945	941	938	936	932	93	928	925	921	918	916	913	91	908	906	902	898	897	894	89	886	882	88	88	88
17	875	87	865	863	858	855	85	845	84	837	832	828	825	82	815	81	808	803	798	795	79	787	783	778	773	77	765	76	758	753	753	
18	773	728	723	719	716	711	709	704	70	698	695	69	687	682	679	676	672	668	665	66	658	652	65	647	642	64	636	632	628	624	624	
19	775	772	77	768	765	762	76	758	755	752	75	748	745	742	74	738	735	732	73	728	725	722	72	718	715	712	71	708	705	702	702	
20	707	703	70	698	694	691	688	685	682	678	675	673	669	665	663	659	657	655	65	648	643	64	638	634	63	628	625	623	619	615	615	
21	686	684	682	68	678	676	674	672	67	668	666	664	662	66	658	656	654	652	65	648	646	644	642	64	638	636	634	632	63	628	628	
22	636	634	632	63	628	626	624	622	62	618	616	614	612	61	608	606	604	602	60	598	596	594	592	59	588	586	584	582	58	578	578	
23	538	533	53	528	522	52	516	512	508	504	50	498	494	49	487	481	48	475	47	468	465	46	457	452	45	447	443	44	436	432	432	
24	503	50	498	493	49	487	483	48	478	474	47	468	466	462	46	457	452	45	448	443	44	438	433	43	428	423	42	418	415	412	412	
25	468	463	46	458	455	452	45	448	445	442	44	438	434	43	428	426	422	42	418	415	412	41	408	405	402	40	398	394	39	388	388	
26	418	413	41	408	405	402	40	398	395	392	39	388	384	38	378	376	372	37	368	365	362	36	358	355	352	35	348	344	34	338	338	
27	368	363	36	358	355	352	35	348	345	342	34	338	334	33	328	326	322	32	318	315	312	31	308	305	302	30	298	294	29	288	288	
28	318	313	31	308	305	302	30	298	295	292	29	288	284	28	278	276	272	27	268	265	262	26	258	255	252	25	248	244	24	238	238	
29	268	263	26	258	255	252	25	248	245	242	24	238	234	23	228	226	222	22	218	215	212	21	208	205	202	20	198	194	19	188	188	
30	20	197	193	19	187	183	18	176	173	17	168	163	16	157	153	15	147	143	14	137	133	13	127	123	12	117	113	11	107	103	103	

PACIFIC

STEEL HEATING BOILERS

For Every Heating Requirement

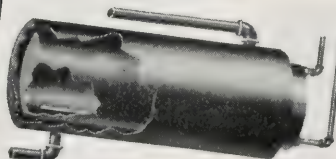
Pacific Oil Boiler
Rear Fired



Pacific Up Draft
Smokeless Boiler



Pacific Circulating
Hot Water Tank



In any type of installation, the Pacific saves boiler room floor space. All tubes cleaned from the front. Rear smoke outlet—no long runs of smoke pipe. Steel construction. All seams and joints electrically welded. Dependable—no cracks.

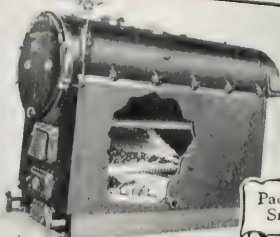
Shipped complete, ready for the job—grates assembled. Set the base, mount the boiler, and the Pacific is ready. No brick work or masonry required. Minimum installation cost. *Write for catalogs.*

PACIFIC STEEL BOILER CORPORATION
228 N. La Salle Street Chicago, Ill.

Pacific Steel
Residence Boiler



Pacific Down Draft
Smokeless Boiler



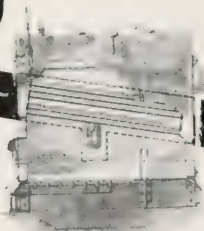
RADIATION LOAD

Key	7000	7100	7200	7300	7400	7500	7600	7700	7800	7900	8000	8100	8200	8300	8400	8500	8600	8700	8800	8900	9000	9200	9400	9600	9800	10000	10200	10400	10600	10800
1	233	233	233	232	232	232	231	231	231	231	230	230	230	229	229	229	229	228	228	228	227	227	226	226	225	225	224	223	223	222
2	218	218	218	217	217	217	216	216	216	216	215	215	215	214	214	214	214	213	213	213	212	212	211	211	210	210	209	208	208	207
3	203	203	203	202	202	202	201	201	201	201	200	200	200	199	199	199	199	198	198	198	197	197	196	196	195	195	194	193	193	192
4	188	188	188	187	187	187	186	186	186	186	185	185	185	184	184	184	184	183	183	183	182	182	181	181	180	180	179	178	178	177
5	178	178	178	177	177	177	176	176	176	176	175	175	175	174	174	174	174	173	173	173	172	172	171	171	170	170	169	168	168	167
6	168	168	168	167	167	167	166	166	166	166	165	165	165	164	164	164	164	163	163	163	162	162	161	161	160	160	159	158	158	157
7	158	158	158	157	157	157	156	156	156	156	155	155	155	154	154	154	154	153	153	153	152	152	151	151	150	150	149	148	148	147
8	148	148	148	147	147	147	146	146	146	146	145	145	145	144	144	144	144	143	143	143	142	142	141	141	140	140	139	138	138	137
9	853	851	85	849	848	847	845	843	841	84	839	838	836	835	833	831	83	829	827	825	823	82	817	813	81	807	803	80	80	80
10	138	138	138	137	137	137	136	136	136	136	135	135	135	134	134	134	134	133	133	133	132	132	131	131	130	130	129	128	128	127
11	110	110	109	108	107	107	106	105	105	104	103	102	101	101	100	99	98	972	965	958	95	945	92	905	89	876	86	847	83	815
12	128	128	128	127	127	127	126	126	126	126	125	125	125	124	124	124	124	123	123	123	122	122	121	121	120	120	119	118	118	117
13	118	118	118	117	117	117	116	116	116	116	115	115	115	114	114	114	114	113	113	113	112	112	111	111	110	110	109	108	108	107
14	108	108	108	107	107	107	106	106	106	106	105	105	105	104	104	104	104	103	103	103	102	102	101	101	100	100	987	98	975	97
15	978	975	972	969	967	965	96	958	955	952	95	948	944	941	938	935	932	93	928	924	92	915	908	902	898	892	887	88	875	87
16	878	875	872	869	867	865	86	858	855	852	85	848	844	841	838	835	832	83	828	824	82	815	808	802	798	792	787	78	775	77
17	75	745	74	735	73	728	723	72	715	71	705	701	699	693	69	685	68	675	673	669	665	66	655	65	647	643	64	638	636	635
18	62	617	612	609	604	60	599	597	595	592	591	589	587	585	583	58	579	578	575	573	57	567	561	559	555	55	548	543	54	535
19	70	698	695	692	69	688	685	682	68	678	675	672	67	668	665	662	66	658	655	652	65	648	642	638	632	628	622	618	612	608
20	613	608	606	603	60	596	593	59	586	583	58	578	574	57	568	563	561	558	555	551	548	545	539	536	533	531	53	528	526	526
21	626	624	622	62	618	616	614	612	61	608	606	604	602	60	598	596	594	592	59	588	586	584	578	572	568	564	56	558	552	548
22	576	574	572	57	568	566	564	562	56	558	556	554	552	55	548	546	544	542	54	538	536	534	528	522	518	514	51	508	502	498
23	43	426	42	417	413	41	407	403	40	397	393	39	387	382	379	375	37	367	363	36	358	35	342	336	328	32	315	305	30	292
24	41	406	402	40	398	393	39	388	383	38	378	373	37	368	363	36	358	355	351	349	346	34	332	326	32	314	307	30	294	285
25	385	382	38	378	375	372	37	368	365	361	359	355	352	35	349	345	342	34	338	335	33	328	32	315	31	305	298	292	288	282
26	335	332	33	328	325	322	32	318	315	311	309	305	302	30	299	295	292	29	288	285	28	278	27	265	26	25	25	25	25	25
27	285	282	28	278	275	272	27	268	265	261	259	255	252	25	249	245	242	24	238	235	23	228	22	215	21	20	20	20	20	20
28	235	232	23	228	225	222	22	218	215	211	209	205	202	20	199	195	192	19	188	188	18	178	17	165	16	15	15	15	15	15
29	185	182	18	178	175	172	17	168	165	161	159	155	152	15	149	145	142	14	138	138	13	128	12	115	11	10	10	10	10	10
30	10	997	993	99	987	983	98	977	973	97	968	963	96	957	953	95	947	943	94	937	933	927	92	913	907	9	0	0	0	0

FACTOR OF SAFETY OVER RADIATION LOAD

Smokeless/

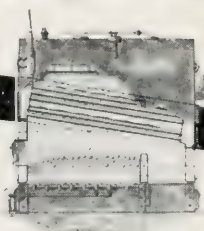
THE SPECIAL
SMOKELESS
ARCH



COPPER-BEARING
STEEL
TUBES

Direct Draft/

COPPER-BEARING
STEEL
TUBES



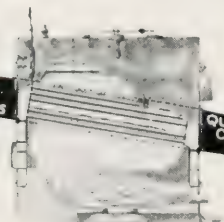
80% DIRECT
HEATING
SURFACE

FOR EVERY HEATING NEED -

The KNOWLTON BOILER

for Oil and Gas/

SUPER-
SENSITIVE
COPPER-TUBES



QUICK HEAT
ON THE CYCLE
OF OPERATION

Specialization—the password of the modern age—has been applied rightfully to heating.

Selecting a particular type boiler for the particular type installation is as important a factor in good heating engineering as the actual installation itself.

Knowlton Boilers cover the varied specifications as perfectly as they burn fuel. Their employment denotes, not only thorough heating knowledge, but also shrewd judgment in economy.

ORR & SEMBOWER, INC.

READING, PENNSYLVANIA

208 N. Clinton St., Chicago 50 Church St., New York



COMPLETE · HEATING · SATISFACTION

RADIATION LOAD

Key	FACTOR OF SAFETY OVER RADIATION LOAD																			
	11000	11200	11400	11600	11800	12000	12200	12400	12600	12800	13000	13200	13400	13600	14000	14400	14600	15000	AND OVER	X
1	222	221	221	220	219	219	218	218	217	217	216	215	215	214	213	212	211	210	210	60
2	207	206	206	205	204	204	203	203	202	202	201	200	200	199	198	197	196	195	195	60
3	192	191	191	190	189	188	188	188	187	187	186	185	185	184	183	182	181	180	180	60
4	177	176	176	175	174	174	173	173	172	172	171	170	170	169	168	167	166	165	165	60
5	167	166	166	165	164	164	163	163	162	162	161	160	160	159	158	157	156	155	155	60
6	157	156	156	155	154	154	153	153	152	152	151	150	150	149	148	147	146	145	145	60
7	147	146	146	145	144	144	143	143	142	142	141	140	140	139	138	137	136	135	135	60
8	137	136	136	135	134	134	133	133	132	132	131	130	130	129	128	127	126	125	125	60
9	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	60
10	127	126	126	125	124	124	123	123	122	122	121	120	120	119	118	117	116	115	115	60
11	80	786	77	755	74	726	71	695	68	665	65	635	62	605	575	545	53	50	50	55
12	117	116	116	115	114	114	113	113	112	112	111	110	110	109	108	107	106	105	105	55
13	107	106	106	105	104	104	103	103	102	102	101	100	100	99	98	97	96	95	95	50
14	965	958	952	945	941	936	93	925	92	915	906	901	896	89	88	868	863	85	85	50
15	855	858	852	845	841	836	83	825	82	815	806	801	796	79	78	768	763	75	75	50
16	758	755	752	745	741	736	73	725	72	715	706	701	696	69	68	668	663	65	65	50
17	633	63	628	625	623	621	62	618	615	613	612	608	606	605	603	60	60	60	60	40
18	53	527	522	519	515	51	508	502	499	495	491	488	482	479	47	463	459	45	45	40
19	602	598	592	588	582	578	572	568	562	558	552	548	542	538	528	518	512	50	50	40
20	525	523	522	52	518	516	515	513	512	51	508	507	506	505	503	50	50	50	50	25
21	544	542	54	532	528	524	52	514	51	504	50	494	49	482	472	464	46	45	45	25
22	494	492	49	482	478	474	47	464	46	454	45	444	44	432	422	414	41	40	40	25
23	285	28	272	265	26	25	25	25	25	25	25	25	25	25	25	25	25	25	25	15
24	282	277	27	262	259	25	25	25	25	25	25	25	25	25	25	25	25	25	25	15
25	278	272	267	26	255	25	25	25	25	25	25	25	25	25	25	25	25	25	25	15
26	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	25	15
27	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	15
28	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
29	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

SPECIAL KEYS

A. 33½% For any amount of radiation.

B. 56% For any amount of radiation.

C. 80% For any amount of radiation.

D. 92% For any amount of radiation.

E. 100% For any amount of radiation.

SPECIAL NOTES

No boiler to be installed having grate longer than 72".

A tolerance of 2% will be allowed on all boiler requirements, as per example herewith: 1,000 square feet load, factor 80%, equals 1,800 square feet boiler—2% tolerance equals 1,764 square feet Boiler required.

FACTOR OF SAFETY OVER RADIATION LOAD

SPECIAL KEYS


- A. 33 1/3% For any amount of radiation.
- B. 56% For any amount of radiation.
- C. 80% For any amount of radiation.
- D. 92% For any amount of radiation.
- E. 100% For any amount of radiation.

SPECIAL NOTES

No boiler to be installed having grate longer than 72".

A tolerance of 2% will be allowed on all boiler requirements, as per example herewith: 1,000 square feet load, factor 80%, equals 1,800 square feet boiler—2% tolerance equals 1,764 square feet Boiler required.

Marsh *Heating* **Systems**



THROUGHOUT 65 YEARS the preference for MARSH Heating Systems has steadily grown. For Marsh has sought through continual development and improvement to maintain its leadership.

So it is that Marsh is now enjoying its greatest and most desirable patronage—constantly doing the biggest jobs as well as the smallest.

Architects and builders should have our Bulletins. Your files are not complete without them.

MARSH PRODUCTS

VACUUM AND VAPOR HEATING SPECIALTIES

GRAVITY HEATING SPECIALTIES

MEDIUM PRESSURE SPECIALTIES FOR COOKING AND
STERILIZING APPARATUS

AUTOMATIC CONTROL AND REGULATING INSTRUMENTS

GAUGE BOARDS COMPLETE WITH ALL INSTRUMENTS

MARSH HI-LO HEATING SYSTEMS

Architects and Engineers are invited to avail themselves of Marsh Engineering Service



JAS. P. MARSH & CO.

Division General Instrument Corporation

2073 Southport Avenue, CHICAGO, ILLINOIS

551—5th Avenue, NEW YORK CITY

Bond Building, WASHINGTON, D. C.

Other Offices in Principal Cities

MINIMUM HEAD ROOM REQUIREMENTS FOR SMOKELESS SETTINGS.

BOILERS

Furnaces		Horizontal Return Tubular				Water Tube				Scotch Marine
		54"	60"	66"	72"	Hor. Baff. 1'-1 1/2" Pitch	Vert Baff 1'-1 1/2" Pitch	Hor Baff 3 1/4" Pitch	Vert Baff 3 1/4" Pitch	
Hand Fired		Shell to Dead Plate	Shell to Dead Plate	Shell to Dead Plate	Shell to Dead Plate	Front Header to Floor				
	No. 6	32"	34"	34"	36"	**6'0"	*	**6'0"	*	##
	No. 7 (Modified)	32"	34"	34"	36"	=	=	=	=	##
	No. 8	32"	34"	34"	36"	6'0"	*	6'6"	*	##
	Hand Stoker	26"	28"	28"	30"	5'6"	*	6'0"	*	Full Extension
		Shell to Floor	Shell to Floor	Shell to Floor	Shell to Floor					
Gravity Feed	Down Draft	60"	60"	60"	60"	6'0"	*	6'6"	*	Full Extension
	Twin Fire	58"	60"	62"	64"	6'0"	*	6'6"	*	"
	Semi Ext. Refuse Burning	44"	46"	46"	48"	7'0"	*	7'6"	*	*
	Burke	48"	48"	50"	54"	5'0"	*	5'6"	*	Full Extension
Chain Grates	McMillan	48"	48"	50"	54"	5'0"	*	5'6"	*	Full Extension
	Twin Fire (Gravity)	48"	48"	50"	54"	5'0"	*	5'6"	*	Full Extension
		72"	72"	78"	78"	7'0"	9'0"	8'0"	10'0"	##
Front Feed	Moore	48"	54"	60"	60"	6'0"	8'6"	6'6"	9'0"	##
	Roney	60"	60"	60"	72"	7'0"	9'0"	7'6"	10'0"	##
	Wetzel	60"	60"	60"	72"	7'0"	9'0"	7'6"	10'0"	##
Side Feed	Detroit	66"	72"	78"	84"	7'6"	*	8'0"	*	Full Extension
	Model	66"	72"	78"	84"	7'6"	*	8'0"	*	Full Extension
	McKenzie	66"	70"	70"	70"	7'6"	*	8'0"	*	Full Extension
	Murphy	66"	72"	78"	84"	7'6"	*	8'0"	*	Full Extension
Underfeed	Type "E"	##	##	##	##	6'6"	8'6"	7'6"	9'0"	##
	Jones	36"	38"	40"	42"	6'0"	8'0"	7'0"	8'6"	Min Diam:
	Detroit	42"	44"	46"	48"	6'6"	8'6"	7'6"	9'0"	Furnace 36"
	Taylor	##	##	##	##	6'6"	8'6"	7'6"	9'0"	##
	Sanford-Riley	##	##	##	##	6'6"	8'6"	7'6"	9'0"	##
	Westinghouse	##	##	##	##	6'6"	8'6"	7'6"	9'0"	##
NOTES										
		* Combinations not recommended as smokeless settings								
		= Not adapted to water tube boilers.								
		## Combinations not ordinarily met with in practice								
		** Omit double arches—using only deflection arch								
		Setting heights for Jones stoker refer to standard stoker								

The accompanying table is intended to show the minimum setting heights for the various combinations of boilers and furnaces found in use in Chicago.

These settings are not intended for high capacities, but have proven satisfactory for normal loads where draft is sufficient and proper methods of operation used.

The setting heights shown for side feed stokers are for furnace widths of 7' 0" or less.

For wider furnaces the heights must be increased to allow for increased arch spring necessitated by the wider span.

Combinations of vertically baffled water tube boilers noted as not being recommended as smokeless settings have been found in actual operation to produce too much smoke to comply with the smoke ordinance in its strictest interpretation, and have proven unsatisfactory from the Smoke Inspector's viewpoint.

Milwaukee Valve Company

"MILVACO" Heating Specialties

Burrell and Chase Streets

Milwaukee, Wis.

Representatives in all Principal Cities

NEW YORK, N.Y.
WASHINGTON, D.C.
SPOKANE, WASH.
READING, PA.
LOS ANGELES, CALIF.
PITTSBURGH, PA.
CHICAGO, ILL.

NEWARK, N.J.
SEATTLE, WASH.
PORTLAND, ORE.
MINNEAPOLIS, MINN.
DETROIT, MICH.
CLEVELAND, OHIO
WINNIPEG, CANADA

LOUISVILLE, KY.
CINCINNATI, OHIO
DAYTON, OHIO
COLUMBUS, OHIO
DENVER, COLO.
ST. LOUIS, MO.
INDIANAPOLIS, IND.

ATLANTA, GA.
DULUTH, MINN.
KANSAS CITY, MO.
BALTIMORE, MD.
FORT WORTH, TEXAS
OMAHA, NEBR.
TOLEDO, OHIO

PHOENIX, ARIZ.
SAN FRANCISCO, CALIF.
RICHMOND, VA.
BOSTON, MASS.
DALLAS, TEXAS
PHILADELPHIA, PA.
JACKSON, MISS.

Packless Valves

NOTE.—In addition to types illustrated, Dole-Milwaukee Packless Valves can be furnished in the following patterns:

Lock and Shield Angle.
Graduate.
Union Gate.
Union Globe and Right and Left Hand Corner.
Always specify steam or water.
Send for Bulletin No. 24

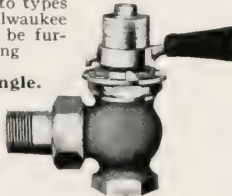


Fig. 209-M
Lever Handle Graduate



Fig. 215-M
Quick Opening Angle

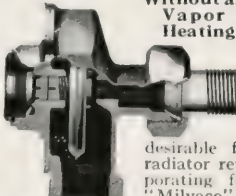


Fig. 210-M
Knob Handle Graduate

All patterns made in sizes 1/2 to 2 in. inclusive.

Thermostatic Trap

Without an equal for Vacuum, Vapor and Modulating Heating Systems.



Illustrated below is a sectional view showing construction of "Milvaco" Thermostatic Traps.

Embodying every desirable feature of successful radiator return traps and incorporating features exclusive in "Milvaco" traps, this product is

a most desirable asset to a heating system. Send for Bulletin No. 23.

Roughing-in Dimensions and Capacities

Fig. No.	Capacity Sq. Ft. Rad.	Pipe Conn.	A Center Line Outlet to End of Spud	B Face of Outlet to Center of Spud
0	75	1/2"	2 1/4"	1 1/2"
1	200	3/4"	3 1/4"	2"
2	500	1"	3 3/4"	2 3/8"

NOTE.—The standard roughing-in dimension, "A" for 1/2 in. traps as adopted by the Heating and Piping Contractors' National Association, is 3 1/4 in. which standard we adhere to. We can, however, upon special request, supply traps with this dimension any length from 2 5/8 to 4 in.

Send for Bulletins showing complete line of specialties.

"Milvaco" Air Eliminator

A heavy substantial float vent for use on heating systems or apparatus where rapid elimination of air is necessary, and where passage of both steam and water must be prevented.

Made in 1/4 to 3/4 in. sizes.

Send for Bulletin No. 26



"Milvaco" Quick Vent

For use at high points on any installation where a large volume of air must be rapidly vented.

A large substantial vent for heavy duty service.

Vents completely at high or low pressures, and the check valve prevents the return of air into the system.

Construction the same as Air Eliminator, eliminating the float.

Made in 1/2 and 3/4 in. sizes.

Send for Bulletin No. 26



"Milvaco" Boiler Return Trap

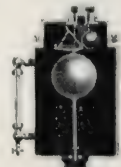
An ideal trap for use on vapor systems for returning water of condensation to the boiler. Positive in action; noiseless in operation; and mechanism not dependent upon action of springs.

Capacity 4000 sq. ft. direct radiation.

Pipe connection 2 in.

Steam and Vent connections 1/2 in.

Send for Bulletin No. 25



"Milvaco" Drip and Blast Traps

"Milvaco" Drip and Blast Traps are a combination float and thermostatic trap which drip any main or riser on any heating system or apparatus where it is necessary to positively eliminate both air and water and close against steam. Not dependent upon temperature for action. Guaranteed to eliminate drip troubles.

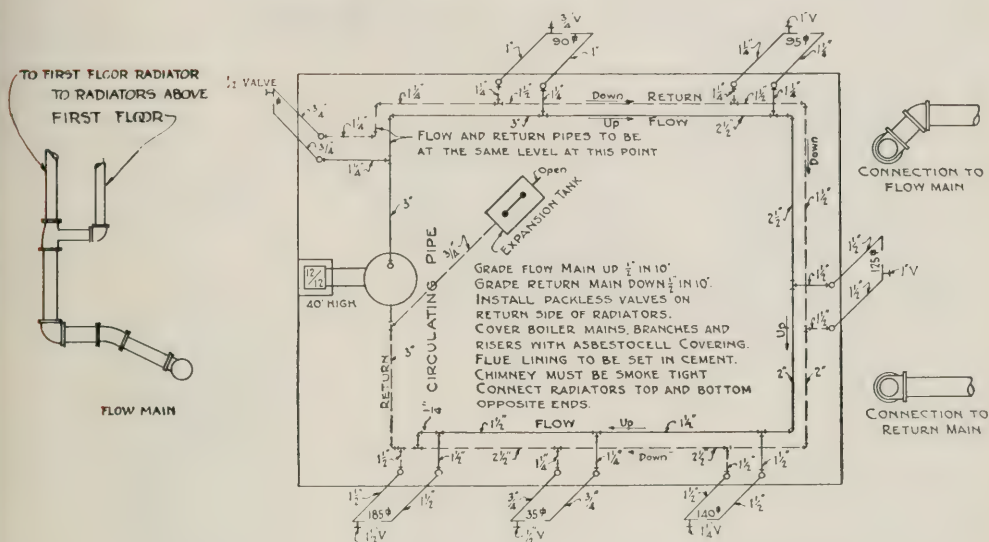


Made in 1/2 to 2 in. sizes, inclusive.

Send for Bulletin No. 27.

TWO-PIPE NON-SHORT CIRCUIT HOT WATER HEATING SYSTEM

HOMER R. LINN. Mechanical Engineer, Member American Society Heating and Ventilating Engineers



Gravity hot water heating systems may be divided into two general heads, viz.: Short circuit systems and non-short circuit systems. These may be subdivided into up feed, feed, down feed, etc.

In the short circuit system the flow and return mains run parallel, grade up away from the boiler and are of corresponding sizes where any radiator is taken off. The first radiator taken off of the flow main is also the first radiator on the return main. We, therefore, have the greatest push or pressure on the flow main and the greatest pull on the return main at this point. The result is that the tendency of all of the hot water is to go through this radiator, while the one on the farther end of the main has less pressure and therefore is sluggish. Various means are resorted to in overcoming this error, such as putting lead washers in the valve unions, taking flow connection off of the side of the main, etc. Any of these are uncertain and often cause trouble which is hard to locate.

In the non-short circuited system the flow main grades up away from the boiler. Where the connection to the first radiator is taken off of the flow main, the connection from the return of this radiator is brought into the end of the return main. In other words, this is the smallest diameter of the return main. It will be seen that we have here the greatest push on the flow main and the least pull on the return main. At this point both mains should be on the same level, but from here on the return main should grade down one-half inch in ten feet, while the flow main should continue to grade up one-half inch in ten feet. The last radiator taken off of the flow main will be the nearest radiator to the boiler on the return main. Therefore, at this point we have the least push in the flow main but the greatest pull in the return main. Thus it will be seen we have no short circuits, but a balanced condition throughout.

The accompanying sketch illustrates how the proper sizes of valves and pipes may be selected from the table. It also shows the best method of making connections to the flow main and also to the return main.

Unless boilers are furnished with integral metal insulating jackets, they should be well covered with a plastic covering having an air space between the boiler and the covering. All mains, branches and risers should be covered with a good grade of moulded covering. The expansion tank pipe may be taken off from either the flow or the return main, whichever is most convenient.

GRAVITY HOT WATER HEATING.

Sizes of mains for basement two-pipe non-short circuit system where mains are not over 100 feet long.

1 1/4" pipe,	0 sq. ft. to 100 sq. ft.
1 1/2" pipe,	101 sq. ft. to 250 sq. ft.
2" pipe,	251 sq. ft. to 400 sq. ft.
2 1/2" pipe,	401 sq. ft. to 650 sq. ft.
3" pipe,	651 sq. ft. to 1000 sq. ft.
3 1/2" pipe,	1001 sq. ft. to 1900 sq. ft.
4" pipe,	1901 sq. ft. to 2500 sq. ft.
4 1/2" pipe,	2501 sq. ft. to 3100 sq. ft.
5" pipe,	3101 sq. ft. to 4000 sq. ft.
6" pipe,	4001 sq. ft. to 5600 sq. ft.

Sizes of Risers.

3/4" pipe,	0 sq. ft. to 70 sq. ft.
1" pipe,	71 sq. ft. to 120 sq. ft.
1 1/4" pipe,	121 sq. ft. to 180 sq. ft.
1 1/2" pipe,	181 sq. ft. to 250 sq. ft.

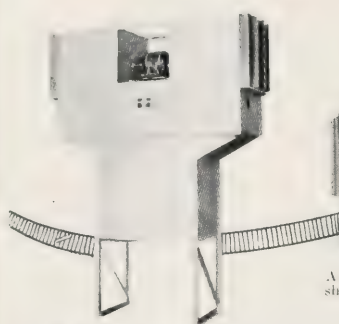
Sizes of Valves.

1/2" valve,	0 sq. ft. to 60 sq. ft.
3/4" valve,	61 sq. ft. to 90 sq. ft.
1" valve,	91 sq. ft. to 130 sq. ft.
1 1/4" valve,	131 sq. ft. to 180 sq. ft.
1 1/2" valve,	181 sq. ft. to 250 sq. ft.

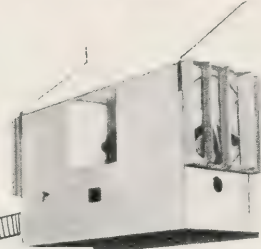
Grade Flow main up and Return main down. 1/2" in 10 ft.

TWINFAN

UNIT HEATERS



Improved Twinfan of floor stand type for large industrial installations.



A Twinfan industrial installation showing how Unit may be bracketed on the wall.

NOW AVAILABLE for EVERY TYPE and SIZE of BUILDING

Made in sizes varying from 200 to 3800 square feet of equivalent direct radiation.

TWINFAN UNIT HEATERS

Are Lighter.

More Compact.

Have Indestructible Lightweight Radiators.

Are Shipped Completely Assembled.

Have Simplified Steam Connections.

Are Completely Lubricated at Factory.

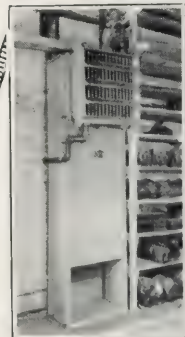
Slow Speed Heaters which are practically noiseless in operation, are available for stores, offices, automobile showrooms, etc.

Twinfan Unit Heaters have enjoyed a constantly growing demand for ten years due to their exclusive patented features.

Bulletins and Specifications on request.



Type "V" (small store room installation) showing overhead mounting on steam piping.



Type "V" (small Twinfan unit heater) floor stand installation.

DWYER EQUIPMENT CO.

4534 W. NORTH AVE. CHICAGO, ILL.

HEAT
WITH

TWINFAN

UNIT
HEATERS

SMOKE ORDINANCE

(Smoke Inspection Department, City of Chicago)

Be it ordained by the City Council of the City of Chicago:

Section 1. Department of Smoke Inspection and Abatement Established). There is hereby established a Department of the municipal government of the City of Chicago which shall be known as the Department of Smoke Inspection and Abatement. The said Department shall embrace a Smoke Inspection and Abatement Commission composed of the Commissioner of Health as chairman, the Commissioner of Buildings, the Corporation Counsel, the Commissioner of Police, and the chief inspector of Steam Boilers and Steam Plants. There shall also be employed, according to law, a Deputy Smoke Inspector in Charge and such other employes as the City Council may provide in the annual appropriation ordinance.

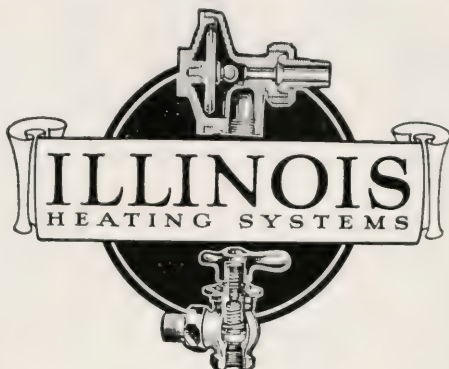
Section 2. Smoke Inspection and Abatement Commission—Duties). It shall be the duty of the Smoke Inspection and Abatement Commission to establish standards, rules and regulations in accordance with the express terms and provisions of this ordinance, for the inspection and control of the installation, reconstruction, alteration, repair and maintenance of heating, power and fuel burning equipment; the prevention and abatement of smoke and noxious gases, and nuisances arising therefrom, the examination and approval of plans of all heating, power and fuel burning installations and of all smoke prevention and abatement installations installed or reconstructed in any building, location or on any premises within the jurisdiction of the City of Chicago.

Section 3. Deputy Smoke Inspector in Charge—Qualifications—Duties). The Deputy Smoke Inspector in Charge shall be an engineer qualified by technical training and experience in the theory and practice of the construction and operation of steam boilers and fuel burning equipment and also in the theory and practice of smoke abatement and prevention. It shall be the duty of the Deputy Smoke Inspector in Charge, under the direction and supervision of the Smoke Inspection and Abatement Commission, to supervise the work of all employes of the department herein created, and to carry into execution the law and ordinances pertaining to smoke prevention and abatement and the installation, reconstruction, alteration and repair of fuel burning equipment, and the standards, rules and regulations adopted by the Smoke Inspection and Abatement Commission.

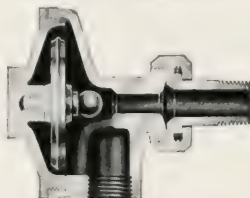
Section 4. Bond). The Deputy Smoke Inspector in Charge, before entering upon the duties of his office, shall execute a bond to the city in the sum of five thousand dollars with sureties to be approved by the Com-

troller, conditioned for the faithful performance of the duties of his office.

Section 5. Construction and Reconstruction of Plans and Specifications—Permit). No new fuel burning plants nor reconstruction or any existing fuel burning plants for producing power and heat, nor either of them, nor refuse burning, nor any new chimney connected with such fuel burning plant, shall be installed, erected, reconstructed or maintained in the City of Chicago until plans and specifications of the same have been filed in the office of and approved by the Deputy Smoke Inspector in Charge and a permit issued by him for such installation, erection, reconstruction or maintenance. Plans and specifications shall be filed with the Deputy Smoke Inspector in Charge, which said plans shall show the type of installation, the amount of work and the amount of heating to be done by such fuel burning plant and all appurtenances thereto, including all provisions made for the purpose of securing complete combustion of the fuel to be used and for the purpose of preventing smoke. Said plans and specifications shall also contain a statement of the amount and kind of fuel proposed to be used and said plans and specifications shall also show that the room or premises, in which such fuel burning plant shall be located, is provided with doors, windows, air-shafts, fans and other means of ventilation sufficient to prevent the temperature of such room, basement or other portion of such building wherein such fuel burning apparatus is to be used, from rising to a point higher than 120 degrees Fahrenheit, and sufficient also to provide that the atmosphere of any such room, basement or other part of the building wherein such fuel burning apparatus may be located, may be changed every ten minutes. Such plans shall further show the dimensions of the room in which such fuel burning apparatus is to be located, the location and dimensions of all chimneys and smoke stacks used in connection with or as a part of said fuel burning plant. Upon the inspection and approval of such plans and specifications by the Deputy Smoke Inspector in Charge, a duplicate set of said plans shall be left on file in the office of said Deputy Smoke Inspector in Charge and upon the payment of the fees as hereinafter provided, and if such plans and specifications shall show that proper provisions for the purpose of securing complete combustion of the fuel to be used and for the purpose of preventing and abating smoke have been made, he shall issue a permit for the installation or for the construction, erection, reconstruction or maintenance of such fuel burning plant. As soon as the Deputy Smoke Inspector in Charge has issued the permit as above provided, it shall be the duty of the various

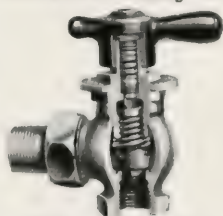


ILLINOIS Thermo Trap



The Original Vertical Seat Trap. Permanently adjusted—self cleaning. Vertical seat avoids trouble by stoppage from dirt. Ball and cone seat; the best known type; seats perfectly at all times. Sensitive and accurate in operation because the diaphragm closes **AGAINST** the steam—not **IN** it. Will withstand 100 pounds steam pressure—a real test. The use of these traps is positive insurance against the usual heating troubles.

ILLINOIS Modulating Valve



Graduated, Quick-Opening, Packless. Bakelite insulated handle, never gets hot. Half turn from full open to closed. Dial shows position of valve.

The *Original* Vapor Heating System (circulation at pressures below atmosphere) . . . *Pioneers* in the prevention of overheating . . . *First* to use "dual trap control"—a Return Trap and an Air Venting Trap.

The proven advantages of Illinois Heating Systems are:

- a moderate, healthful heat during mild weather, avoiding overheating common to ordinary steam jobs.
- all the heat you want in winter weather by adjusting the firing periods.
- easy control of room temperatures.
- a remarkable fuel economy.
- durability of apparatus.
- noiseless operation.

In addition to special Vacuum and Vapor heating appliances we manufacture a complete line of specialties for the automatic control of steam. This enables us to use the proper device to secure results under widely varying conditions in **EVERY** type of building. With balanced parts of our own manufacture, designed to work in unison, we **GUARANTEE SATISFACTORY RESULTS.**

ILLINOIS PRODUCTS

Radiator Traps
Modulating Valves
Low Pressure Boiler
Return Traps
Pressure
Reducing Valves
Heat Retainers

High and Low
Pressure Steam Traps
Blast Traps
Separators
(Oil and Steam)
Back Pressure Valves
Expansion Joints

Write for bulletins

REPRESENTATIVES IN 40 CITIES OF U.S.A.
ILLINOIS ENGINEERING COMPANY
 ROBT. L. GIFFORD President INCORPORATED 1900
CHICAGO

departments having charge of the inspection of the premises wherein said fuel burning apparatus is located to cooperate with the said Deputy Smoke Inspector in Charge; to see that the execution of the work so permitted by said permit shall be done in conformity with the plans and specifications submitted and approved, and the standards, rules and regulations fixed by said Smoke Inspection and Abatement Commission.

Section 6. Use of Plant—Certificate of Deputy Smoke Inspector in Charge Required). It shall be unlawful for any person to use any new or reconstructed plant for the production and generation of heat and power, or either of them, until he shall have first procured a certificate from the Deputy Smoke Inspector in Charge certifying that the plant is so constructed that it will do the work required, and that it can be so managed that no dense smoke shall be emitted from the chimney connected with the furnace or fire-box, in violation of the provisions of this ordinance.

Section 7. Chimneys and Furnaces—Repairs—Permit Required—Penalty). No owner shall install, alter or repair any chimney or any furnace or device, which alteration, change or installation would affect the method or efficiency of preventing and abating smoke, without first submitting plans and specifications to the Deputy Smoke Inspector in Charge and securing a permit therefor, nor shall any owner alter or repair any brick-work on or about a high pressure boiler without first submitting plans and specifications to the Deputy Smoke Inspector in Charge and securing a permit therefor. Any person, firm or corporation who shall violate this Section shall be liable to a fine of \$25.00 for each day upon which he or they shall prosecute such alteration, change or installation without a permit and each day's violation shall constitute a separate offense.

Section 8. Fees—When Remitted). The fees for the inspection of plans and issuing of permits, and for the inspection of furnaces or other fuel-burning apparatus or devices, and issuing of certificates, shall be as follows:

For inspecting plans of new plants and of plants about to be reconstructed, two dollars.

For inspecting plans for repairs and alterations, one dollar.

For permits for the erection, installation, reconstruction, repair or alteration of any furnace or other fuel-burning apparatus, smoke-prevention device or chimney, five dollars for each unit, or single apparatus.

For examining or inspecting any new or reconstructed furnace connected to a high pressure boiler after its erection or reconstruction and before its operation and maintenance, five dollars for the first unit or single apparatus, and three dollars for each additional unit or single apparatus.

For examining or inspecting any new or reconstructed furnace connected to a low pressure boiler or any other fuel-burning equipment, or any smoke-prevention device, after its erection or reconstruction and before its operation and maintenance, three dollars for each unit or single apparatus.

Provided, however, that this Section shall not apply to furnaces or other fuel-burning apparatus or devices installed or used to heat private residences, tenements or buildings consisting of two apartments or less.

The aforesaid fees shall be paid to the City Collector prior to the approval of plans for such installations by the Deputy Smoke Inspector in Charge.

The fee for the examination or inspection shall include the issuing of a certificate for operation in case such certificate for operation is granted and shall be paid at the time the permit is secured.

The Deputy Smoke Inspector in Charge may and he is hereby directed and instructed to remit all inspection or examination fees charged against any and all charitable, religious and educational institutions, when the furnace or other device or apparatus inspected is located in or upon premises used and occupied exclusively by such charitable, religious or educational institution; provided that such charitable, religious or educational institution is not connected or carried on for private gain or profit; and provided further that the Deputy Smoke Inspector in Charge may require every application for the remission of such fees to be verified by the affidavit of one or more taxpayers of the City.

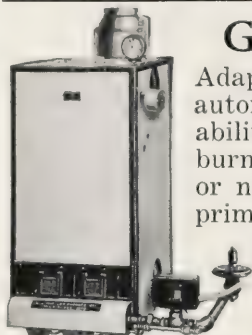
Section 9. Emission of Dense Smoke—Regulation—Penalty). The emission of dense smoke within the city from the smoke stack of any locomotive, steam boat, steam tug, steam roller, steam derrick, steam pile driver, tar kettle or other similar machine or contrivance or from any open fire or from the smoke stack or chimney of any building or premises except for a period of or periods aggregating six minutes in any one hour at the time when the fire-box is being cleaned out or a new fire being built therein, is prohibited and is hereby declared to be a nuisance and may be summarily abated by the Deputy Smoke Inspector in Charge or by anyone whom he may duly authorize for such purpose. Such abatement may be in addition to the fine hereinafter provided. Any person, firm or corporation owning, operating or in charge or control of any locomotive, steam boat, steam tug, steam roller, steam derrick, steam pile driver, tar kettle or other similar machine or contrivance or any open fire or of any building or premises, who shall cause or permit the emission of dense smoke within the City of Chicago from the smoke stack or chimney of any such locomotive, steam boat, steam tug, steam roller, steam derrick, steam pile driver, tar kettle or other similar machine or contrivance or any open fire or from the smoke stack or chimney of any building controlled or in charge of him, her or them, except for a period of or periods aggregating six minutes in any one hour at the time when the fire-box is being cleaned out or a new fire being built therein, shall be deemed guilty of a violation of this Section and upon conviction thereof shall be fined not less than ten dollars nor more than one hundred dollars for each offense, and each emission of dense smoke in violation of the provisions of this Section shall constitute a separate offense for each and every day on which such violation shall continue.

Section 10. Dust, Soot, Noxious Gases, Abatement). No person or persons, firm or corporation shall cause, permit or allow the escape from any smoke stack or chimney into the open air of such quantities of ash dust, soot, cinders, acid or other fumes, dirt or other material or noxious gases in such place or manner as to cause injury, detriment, nuisance or annoyance to any person or persons or to the public or to endanger the comfort and repose, health or safety of any such person or persons or the public or in such a manner as to cause or have a natural tendency to cause injury or damage to business or property.

Any person or persons, firm or corporation causing, permitting or allowing the escape from any smoke stack or chimney into the open air of such quantities of ash dust, soot, cinders, acid or other fumes, dirt or other material or noxious gases, in such place or manner as to cause injury, detriment, nuisance or annoyance to any person or persons or to the public or to endanger the comfort and repose, health or safety of any such person or persons or the public or in such a manner as to cause or have a natural tendency to cause injury or damage to business or property, shall be deemed guilty of a vio-

L.J. MUELLER FURNACE CO.

189 Reed Street
MILWAUKEE, WISCONSIN
Chicago Branch: 413 N. State Street



GAS-ERA GAS-FIRED BOILERS

Adaptable for steam or hot water heating. Completely automatic operation. Cast iron construction for durability, with asbestos-lined metallic jacket. Vertical burner adjustment permits use with any manufactured or natural gas. Have steady water line and will not prime. Interior surfaces may be thoroughly cleaned without disturbing jacket. Multiple unit construction permits increase in size when desired. Boiler is highly efficient securing maximum heat utilization with minimum gas consumption.

Hot Water		Steam		Floor Space, in.	Vents		Gas valve size, in.	
Boiler No.	A. G. A. Rating	Boiler No.	A. G. A. Rating		Number	Diam., in.	Mfg. gas	Nat. gas
13-W	670	13-S	420	31 1/4 x 46 1/2	1	4	1	1
25-W	1,340	25-S	840	39 x 47 7/8	1	7	1 1/4	1 1/4
37-W	2,010	37-S	1,260	46 3/4 x 51 7/8	1	9	1 1/2	1 1/4
49-W	2,680	49-S	1,680	54 1/2 x 53 5/8	1	10	1 1/2	1 1/4
511-W	3,350	511-S	2,100	62 1/4 x 54 3/4	1	11	1 1/2	1 1/2
613-W	4,020	613-S	2,520	70 x 51 5/8	2	9	1 1/2	1 1/2
715-W	4,690	715-S	2,940	79 3/4 x 53 5/8	2	10	1 1/2	1 1/2
817-W	5,360	817-S	3,360	87 1/2 x 53 5/8	2	10	1 1/2	1 1/2
919-W	6,030	919-S	3,780	95 1/4 x 54 3/4	2	11	1 1/2	1 1/2
1021-W	6,700	1021-S	4,200	103 x 54 3/4	2	11	1 1/2	1 1/2
1123-W	7,370	1123-S	4,620	110 3/4 x 56 1/8	2	12	1 1/2	1 1/2
1225-W	8,040	1225-S	5,040	120 1/2 x 53 5/8	3	10	1 1/2	1 1/2
1327-W	8,710	1327-S	5,460	128 1/4 x 54 3/4	3	11	1 1/2	1 1/2
1429-W	9,380	1429-S	5,880	136 x 54 3/4	3	11	1 1/2	1 1/2
1531-W	10,050	1531-S	6,300	143 3/4 x 54 3/4	3	11	1 1/2	1 1/2
1634-W	10,720	1634-S	6,720	87 1/2 x 107 1/4	2	14	1 1/2	1 1/2
1838-W	12,060	1838-S	7,560	95 1/4 x 109 1/2	2	16	1 1/2	1 1/2
2042-W	13,400	2042-S	8,400	103 x 109 1/2	2	16	1 1/2	1 1/2
2246-W	14,740	2246-S	9,240	110 3/4 x 112 1/4	2	17	1 1/2	1 1/2
2450-W	16,080	2450-S	10,080	120 1/2 x 107 1/4	3	14	1 1/2	1 1/2
2654-W	17,420	2654-S	10,920	128 1/4 x 109 1/2	3	16	1 1/2	1 1/2
2858-W	18,760	2858-S	11,760	136 x 109 1/2	3	16	1 1/2	1 1/2
3062-W	20,100	3062-S	12,600	143 3/4 x 109 1/2	3	16	1 1/2	1 1/2

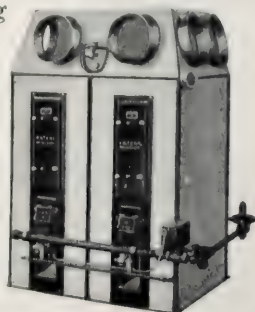
GAS-ERA Gas-Fired Warm Air Furnaces

Cast-iron construction, with lacquered casing in attractive color. Completely automatic, tamper-proof operation. Burns any gas, natural or manufactured. Accessible for cleaning. Ample free area. Automatic moisture supply. Adaptable for forced air heating on large jobs. Multiple unit construction.

Furnace No.	A. G. A. Input Rating B. T. U. per Hr.	Total Load B. T. U. per Hr.	Capacity Warm Air Pipes Sq. In.
1 (10)*	65,000	47,500	430
2 (20)	130,000	95,000	860
3 (30)	195,000	142,500	1290
4 (40)	260,000	190,000	1720
5 (50)	325,000	237,500	2150
6 (60)	390,000	285,000	2580

*Same Furnace, less electrical equipment and automatic humidifier.
Data on larger units on application.

GAS-ERA Furnaces and Boilers are tested and approved by American Gas Association



lation of this Section and upon conviction thereof shall be fined not less than \$10.00 nor more than \$100.00 for each offense and each violation of the provisions of this Section shall constitute a separate offense for each and every day upon which such violation shall continue.

All persons participating in any violation of this provision either as owners, proprietors, lessees, agents, tenants, managers, superintendents, captains, engineers, firemen or janitors or otherwise shall be severally liable therefor, and to the penalties fixed in this ordinance.

Section 11. Violations—Prosecutions). Prosecutions for all violations of this ordinance shall be instituted by the Deputy Smoke Inspector in Charge and shall be prosecuted in the name of the City of Chicago.

The issuance and delivery by the Deputy Smoke Inspector in Charge of any permit or certificate for the construction or reconstruction, or any permit for the alteration or repair of any plant or chimney, connected with a plant, shall not be held to exempt any person or corporation to whom any such permit has been issued or delivered, or who is in possession of any such permit, from prosecution on account of the emission or issuance of dense smoke caused or permitted by any such person or corporation.

Section 12. Penalty). Any person who shall violate any of the provisions of this ordinance (except as herein otherwise provided) shall be fined not less than twenty-five dollars or more than one hundred dollars for each offense.

Section 13. Fraud—Favors—Penalty). If any person acting on behalf of the City under the provisions of this ordinance shall take or receive any money or any valuable thing

for the purpose of deceiving or defrauding any person or persons, or for the purpose of favoring any person or persons, or if any employee shall recommend the issuance of any certificate of inspection without having at the time stated, thoroughly examined and tested the furnace, device or apparatus so certified, he shall be fined one hundred dollars for each offense.

Section 14. This ordinance shall take effect and be in force from and after its passage and due publication.

SPECIAL RULING

By

Department of Smoke Inspection and Abatement

(Approved by the Advisory Smoke Abatement Board of Engineers)

Section 5 of the Smoke Ordinance requires that proper provision for the purpose of securing complete combustion of the fuel to be used and for the purpose of preventing and abating smoke shall have been made before a permit is issued for the installation of any fuel burning plant for producing power and heat or either of them.

The Department of Smoke Inspection and Abatement will not approve or issue permits for the installation of low pressure heating boilers or hot water heaters of the surface burning type for burning coal, in sizes larger than those having a capacity to supply steam to 1200 square feet of direct steam radiation or its equivalent or to supply hot water to 2000 square feet of hot water radiation.

The surface burning type of coal burning furnace is defined as a hand fired furnace in which the fresh fuel is thrown directly on the hot fuel bed.

CHIMNEY SPECIFICATION

Homer R. Linn.

The walls of the chimney shall be of brick and shall be lined with approved fire clay flue lining. The joints of the flue lining shall be made air tight. The cleanout space at the bottom of the chimney shall be air tight when the cleanout door is closed. Flue lining shall start at least 4" below the bottom of the smokepipe intake and shall be continuous the entire height of the flue and project at least 4" above the chimney top to allow for a 2" wash and a 2" projection of the lining. The wash shall be formed of a rich cement mortar.

Chimneys shall not rest upon or be carried by wooden floors, beams, nor be hung from wooden rafters, but shall be built upon concrete or masonry foundations properly designed to carry the weight imposed without danger of settling or cracking.

Flues shall be .. in. x .. in. x .. ft. high (in no case shall the area of the flue be less than 12" x 12"), built vertical, without offsets and full size from the smokepipe inlet to the top of chimney.

The top of the chimney shall be at least 3 feet higher than the highest point of the building and in no case shall it be less than 30 feet above the boiler or furnace grates.

There shall be but one connection to the flue

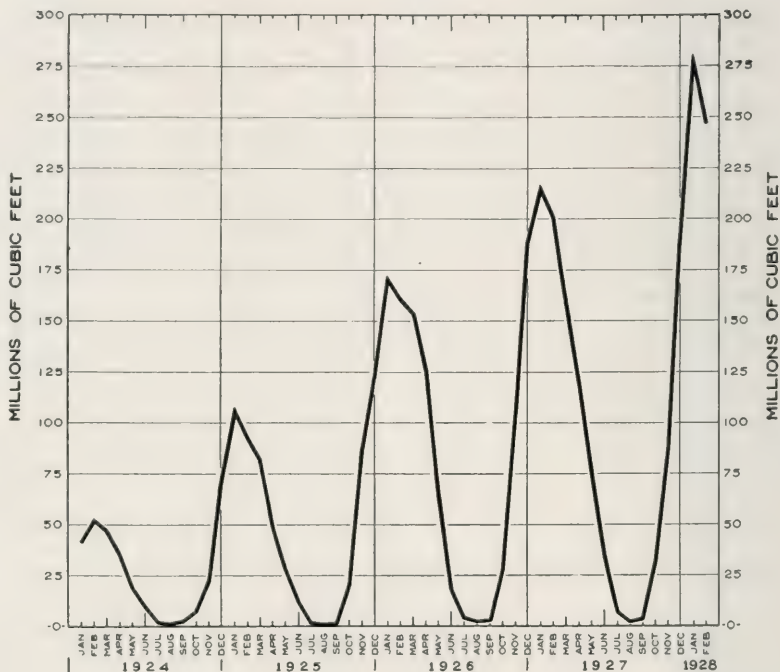
to which the boiler or furnace smokepipe is connected. The boiler or furnace smokepipe shall be thoroughly grouted into the chimney and shall not project beyond the inner surface of the flue lining.

The chimney flue to which the heating boiler is connected shall be subjected to a smoke test by the mason contractor in the presence of the architect, or his representative, after the mortar has thoroughly hardened, and must be SMOKE TIGHT.

The method of conducting this test shall be as follows: With a good fire in the boiler or furnace, or in the base of the chimney, put about a square yard of tar paper on the fire. As soon as smoke appears at the top of the chimney, close the top of the flue with a piece of old carpet or wet newspapers held down by a weighted board. Keep the tar paper burning in the firepot for five minutes. The architect or his representative shall sign an acceptance in triplicate, stating that the chimney was tight under the above test, and shall give one copy to the mason contractor; one copy to the heating contractor and one copy to the owner.

All work done under this specification must be in accordance with the requirements of the National Board of Fire Underwriters.

Gas for House Heating Increases Yearly



THE chart shows the increase in sales of gas for house heating. Since the special rate for this kind of heating was inaugurated, new installations have been made at the rate of approximately 500 per year. Indications are that 1928 will show a marked increase over the average.

Call WABash 6000

*Consult our Architects and Builders Service
for facts and figures concerning Gas for*

House Heating

The Peoples Gas Light and Coke Company

HEATING BY GAS

By **FREDERICK W. HERENDEN.**

Developments in coal treatment and processing are tending toward the rendering available of large quantities of gas suitable for building-heating and kindred purposes. The use of gas for such purposes has been made possible by the development of extremely reliable and efficient gas-burning devices; and has been further encouraged through the creation by public utility corporations, of rate structures that offer to the user of gas for building-heating, the privilege of purchasing large quantities of gas at attractively low rates.

Apparatus Should Be Especially Designed.

The combustion characteristics of gas are such that it can be utilized most economically and satisfactorily in a heating device; be it a steam or hot water boiler, or a warm air furnace; when that device has been designed solely for the use of gas. Flame characteristics and freedom from fuel-bed draft losses dictate design features that are not found in the device originally designed to burn solid fuel. These peculiar design features are incorporated in a number of well known gas-burning heating appliances, which differ in details of refinement to a somewhat greater extent than in fundamental principles.

Appliances and Controls.

Gas-burning heating devices, designed solely for the utilization of gas as a fuel, are available for steam, hot water, and warm air heating systems in a size range extending from the small bungalow to the large office building. Small gradations between successive sizes in any given line of appliances, enable heating requirements to be met with the minimum amount of excess capacity being necessitated. Absolute certainty as to the performance and heat generating capacity of a gas-burning appliance enables the choice of the proper type and size to be made with a high degree of accuracy. Freedom from the effect of variable drafts, high winds, and low barometric pressure make the selection of the proper size of gas-burning appliance a problem that can be solved with scientific accuracy.

Boilers.

The usual heating Boiler designed for gas fuel is sectional in construction, made of a number of parallel and substantially vertical cast-iron sections. Different makers resort to different expedients to render their heating surfaces as effective as possible. Some use a tubular design, others use extended surface in the form of lugs, or ribs; while some may incorporate both of these features or other features peculiar to their individual design. Horizontal burners of the atmospheric bunsen type, usually with drilled ports in cast-iron bodies, are the general means of burning the gas. The burners are arranged directly beneath the sections. The entire assembly is almost invariably enclosed in a well insulated sheet metal jacket, generally finished in a more or less attractive surface and color.

High Gas Velocity Without Undue Friction.

Due to the absence of any draft loss due to fuel-bed, the gas passages can be designed to provide the high gas velocity essential to effective heat transmission; while at the same time keeping the actual frictional effect to such a low figure that pressures within the combustion and flue spaces are practically atmospheric. Since the gas is delivered to the burners by the Gas Company at a definite and positive pressure, no mechanical devices, such as motors and blowers, are necessary for the delivery of the fuel and for its mixture with

the air for combustion. The usual building-heating appliance designed originally for the use of gas, is free of moving parts or of the necessity for electric current to insure steady operation. Due to the fact that combustion and flue gas travel take place at practically atmospheric pressure, such an appliance will operate successfully on practically no draft. Devices to place in the flue connection for the purpose of reducing the pull of the chimney and to minimize the effect of variable atmospheric conditions, are standard parts of gas designed heating appliances. Due to the freedom from the effect of variable chimney drafts, constant efficiencies of 80 per cent or better can be maintained throughout the heating season.

Controlling Devices.

Gas designed heating appliances are provided with controlling devices that insure continued automatic operation at a constant efficiency, free from possibility of accidental shut-down. They should always be operated under the primary control of a room thermostat. The quick response of the gas-burning heating appliance to demands for heat, together with its small heat storage capacity, enables the temperature of the premises served by a well designed system to be held within a two degree range. Standard controlling devices on gas designed heating appliances include a gas pressure regulator that maintains a constant rate of fuel supply, steam pressure or water temperature limit control, low water cutoff devices on steam boilers, and thermostatic pilots that prevent waste of unburned gas in the event of pilot outage. All of these controlling devices may be absolutely independent of electrical current, so that in the event of current failure the heating of the premises is uninterrupted.

Clock Controlled Thermostats.

Room temperature thermostats for application to heating systems served by gas-burning appliances may be secured, if desired, with a clock that functions automatically to reduce the temperature of the premises to a predetermined figure at a certain hour, and then to bring it back up to the normal figure at another predetermined time. The quick response of the gas-burning appliance enables this practice to be followed with quite satisfactory results. Extensive experiments indicate that a worth-while fuel saving occurs as a result of maintaining a lower temperature during the night hours.

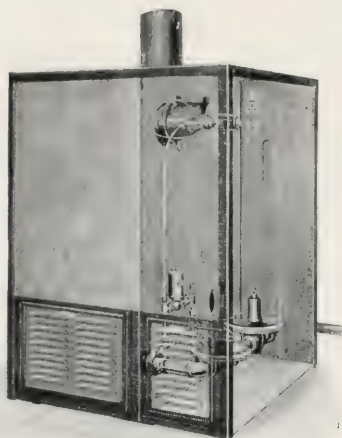
Warm Air Furnaces.

A number of warm air furnaces, designed exclusively for gas fuel, are available. There is a greater variation in types of warm air furnaces than in steam and hot water boilers. Furnaces are made with cast-iron heating surfaces, sheet metal surfaces, or with combinations of the two constructions. Straight upward flue travel is found in some, while others are constructed with reversible flues. In recent years furnaces have appeared on the market which are designed solely for forced air operation secured with a fan. Furnaces which are designed for gravity operation seem, however, to be capable of universal application and to give equally good operating results when used with a fan and an air distributing system laid out for fan operation. Cleanliness, automatic control, quick response, and possibility of artificial humidification, render a warm air system served by a gas-burning furnace, a type of heating plant suitable for installation in the highest class of residence.

Warm air furnaces are capable of control by room thermostats, and in addition are pro-

Bryant Gas Heating

has stood the
Endurance Test of Time



Phantom view of Model 45 Boiler.

The cast iron sections of the Bryant Boiler present a large area of heat absorbing surface while the water tube construction promotes a definite circulation of water throughout the height of the section. Staggered gas travel contributes to maximum efficiency.



Battery of Sections and Base.

BRYANT
GAS
HEATING



For complete data on sizes, ratings, etc., or for copy of Handbook on Bryant Gas Boilers, address

THE BRYANT HEATER & MFG. COMPANY

116 S. Michigan Ave.

Chicago, Ill.

Phone Franklin 4720-21

vided with gas pressure regulators, air temperature limiting devices, and thermostatic pilots.

Appliance Ratings and Selection.

In sharp distinction with most fuel-burning devices, a gas-burning heating appliance can be operated at a fixed predetermined rate of fuel input with no possibility of a variation in excess of plus or minus two per cent; and will, under those conditions, deliver a known and fixed quantity of heat available for distribution to the system. The fuel furnished by a Gas Company may be expected to be constant in heat value. The rate at which it is fed is maintained constant by a gas pressure regulator. The heat transfer efficiency of the appliance is unaffected by atmospheric conditions; neither is there any possibility of soot accumulation on the heating surfaces to interfere with heat transmission. One uncertainty in the selection of a boiler or furnace size is thus eliminated. The appliance output is the most certain factor in the entire system.

Scientific Rating.

Appliance ratings are determined by a laboratory test which establishes the amount of heat available for delivery to the heating system. In the case of a steam or water boiler, the ratings in square feet of radiation are secured by dividing the hourly B. t. u. output by 240 and 150, respectively. These ratings are a true measure of the heat delivering capacity of the boiler. The selection factors given on Page 565 (in the 1928 Edition) are applicable to boilers rated in such a manner, when they are to be applied to heating systems consisting exclusively of direct radiation. When a heating system includes other varieties of radiation, such as blast coils or unit heaters, the selection of boiler size must be based on engineering considerations rather than on inflexible rules.

Furnace ratings are generally expressed in terms of the hourly B. t. u. available at the bonnet. Since in a gravity system from 15 to 20 per cent of the heat at the bonnet is lost on its way to the registers, the furnace rating required can be safely determined by dividing the calculated hourly heat loss from the premises by 0.80. In the case of a fan system, the transmission losses are somewhat smaller and the dividing factor can be correspondingly increased.

INSTALLATION

Aside from the connection to the heating system, in which a gas appliance does not in the least differ from any other fuel burning appliance, the following points should be considered in the installation of a gas-burning heating device:

(a) Gas Supply.

Obviously, the pipe carrying the gas from the meter to the appliance must be large enough to deliver the required amount of fuel at the prevailing pressures. The valves and connections that are sold as part of the appliance are proportioned to carry the required gas at the lowest supply pressure that can reasonably be expected to persist. That is a responsibility of the appliance manufacturer. If the line running from the meter to the appliance is one pipe size larger than the gas control valves, it will have adequate capacity.

(b) Air Supply for Combustion.

Gas, like any other fuel, requires air for its combustion. The air necessary to sustain combustion and to maintain adequate boiler room ventilation amounts to at least 7.5 cubic feet for each cubic foot of 500 to 550

B. t. u. gas. Failure to provide for the entrance of sufficient air into the boiler room to meet this requirement, results in symptoms that may be mistaken for those of insufficient draft. The effect of insufficient air is more evident to the eye with gaseous fuel than with solid or liquid fuel, but is no more destructive to efficiency of combustion.

(c) Venting Flues.

Although a gas designed appliance operates with practically atmospheric pressure within its combustion and flue spaces, it nevertheless needs adequate provision for venting the products of combustion. Poor chimney conditions are prolific causes of condensation of water vapor within chimneys and chimney connections, as well as of poor combustion due to vitiated air within the boiler room. Although the products of combustion issuing from an appliance designed for gas-burning, such as a standard make of gas boiler or gas furnace, are totally harmless to life, still every effort should be made to insure their adequate venting from the premises through a suitably effective chimney.

(d) Small Fire Hazard.

When a heating appliance designed for gas burning is installed, no particular precautions in the direction of fire prevention are necessary. Standard makes of appliances are thoroughly insulated and give off very little heat to surrounding objects. With most appliances all of the electrical wiring involved can be low voltage. There is no fuel storage required, nor are chimney temperatures at all high.

Operating Costs.

Considered on the cost in cents of a million B. t. u., gas, particularly manufactured gas, is a comparatively high-priced fuel. It is an axiom, however, that the first cost of fuel is only a part of the total cost of heating. The greater the ratio which the first cost of any fuel bears to the total cost of heating with that fuel, the more possibilities for true economy that fuel possesses. In evaluating the cost of heating a given space, the following are among the items that should be given consideration:

- (a) Initial investment for apparatus.
- (b) Value of the space occupied by the apparatus.
- (c) Rate of depreciation of the apparatus.
- (d) Cost of attendance, including ash handling.
- (e) Reliability in operation, possibility of service being required, and cost of that service.
- (f) Space required for fuel and ash storage, and its value.
- (g) Inconvenience and damage from dust and soot.

Without going into the calculation of a concrete example, let it be said that proper calculation of comparative heating costs, including the factors mentioned above, will often reveal the comparatively high-priced gas to be actually cheaper than other fuels selling at a less sum per million B. t. u.

In large installations the amount of gas required per square foot of radiation per season depends to a great extent on the characteristics and uses of the building to be heated. Each case should properly be figured out on its own merits by an engineer familiar with gas applications. Smaller installations, such as residences, can be estimated with reasonable accuracy by the use of simple factors based on past experience. In the neighborhood of Chicago, it can be safely assumed that the average residence will require about 1140 cubic feet of gas per season per square foot of steam radiation, or 860 cubic feet per season per square foot of water radiation.

RAY

Rotary Oil Burners

DOMESTIC

INDUSTRIAL

COMMERCIAL



Reg. U. S. Pat. Off.

AUTOMATIC Ray Burners of the Automatic Type are listed by the Underwriters and are supplied in both gas-electric and straight electric ignition, and are manufactured in a range of sizes to adequately heat the smallest cottage or the largest commercial, industrial or office building.

MANUAL This type of unit is listed by the Underwriters, and is semi-automatically controlled from the boiler, and is designed for larger commercial structures such as apartment buildings, apartment hotels, churches, theatres, industrial plants, office buildings, etc. This type of burner is particularly adapted to those buildings wherein an attendant is customarily on duty.

ECONOMICAL Many exclusive patented features tend to make the Ray the most economical of all burners. The Ray angular vane nozzle, which is one of the patented features, permits the burning of heavy fuels to as low as 10 deg. Baume. Ray Burners of both the full automatic and the manual type are listed by the Underwriters to burn 18-20 gravity oil. The burning of heavy fuels, because of their high BTU content and their extremely moderate cost per gallon, is more economical and reduces operating costs.

Ray Burner Co.

Successor to W. S. Ray Mfg. Co., Inc.

Chicago Branch

720 CASS STREET

Phones Superior 5490-1-2

OIL HEATING

By **HARRY F. TAPP**, Technologist
The American Oil Burner Association

Because of the large number of reliable oil burners that are on the market, there is considerable confusion as to the relative merits of these burners. Certainly it is important to look into the construction of the burner as to design, workmanship and materials, but a point that should be kept in mind, is that you are buying not only a burner but an installation. The ability of the man making the installation and adjusting the burner to meet the needs of each application, should receive careful consideration when making a choice of oil heating equipment.

Burner Types and Characteristics

There are two distinct types of oil burners used for oil heating—the natural draft burner and the mechanical draft burner. Their names indicate the manner in which the air for combustion is obtained.

The natural draft burner requires no motor and usually has no moving parts. The air for combustion is supplied by the pull of the draft and is therefore dependent upon the design of the chimney. This type of burner is often incorrectly referred to as a gravity type burner. Gravity indicates the manner in which the fuel is fed to the burner and a gravity system is applicable to either the natural draft or the mechanical draft burner.

The mechanical draft burner is motor driven and the air for combustion is supplied by a fan or blower. Generally where a fan is used it is of sufficient capacity to supply the entire amount of air for combustion when the burner is operating at the maximum rate. Where a blower, either centrifugal or positive pressure, is used, only a portion of the air required is supplied under pressure, the balance being induced by the injector action of the air from the blower plus the pull of the natural draft from the chimney. The air from the blower is usually used to aid in the atomization of the fuel.

The natural draft burner is more sensitive to changes in the weather, wind currents about the chimney and other factors which cause a variation in the draft intensity, than is the mechanical draft burner. This condition can be helped considerably with a well designed chimney and the use of a draft regulator made for this purpose. This type of burner is usually made in small sizes only and has in its favor a low first cost, simplicity of design and requires no power for operation.

With mechanical draft burner the fan or blower produces a more constant supply of air under varying draft conditions and therefore, maintains a uniform efficient, combustion condition.

The second classification of burners usually made is with reference to the means employed to prepare the fuel for combustion. The terms used are vaporizing and atomizing burners.

In the vaporizing burner the fuel is prepared for combustion by the addition of heat. The heat serves to convert the liquid fuel into a vapor which is mixed with the air for combustion either just before or during the combustion process. Blue flame combustion is sometimes advocated but as a blue flame radiates very little heat it is of no particular advantage in a boiler or furnace that has been designed for coal burning.

By vaporizing the fuel, moving parts can be eliminated and it is very easy to control in low capacities. Vaporizing burners require a light fuel and with poor design, there is the possibility of carbon trouble due to cracking or decomposition of the oil in the vaporizing chamber.

In the atomizing burner the fuel is broken into a fine mist of small particles which are mixed with the air for combustion either just before or at the time they are forced into the combustion chamber. The particles are so fine that they are quickly vaporized by the heat of combustion and, if properly mixed with the air for combustion, burn with a clean hot flame.

There are many ways to atomize oil—under pressure through a small orifice, by compressed air or steam, by centrifugal force from the edge of a rapidly rotating cup or disc and numerous other methods equally efficient. All of the methods will break the oil into very fine particles and when applied with intelligence will give satisfactory results.

With the atomizing burners slightly cheaper oils may be successfully utilized, they will start readily from a cold condition and can be applied to installations requiring a high fuel consumption.

Ignition Systems.

In most natural draft burners the oil is lighted manually with a torch through the firing door, although some of them are provided with a gas pilot. Full automatic burners are ignited with either an electric spark from a spark transformer or from a gas pilot light. This gas pilot in some designs burns constantly, while in others a combination of the electric and the gas system is used, the spark igniting the gas and the gas flame igniting the oil.

The type of ignition system that is used is dependent, to some extent, upon the design of the burner and upon the personal opinion of the designer. Several burners are being designed so as to make the means for ignition optional with the purchaser. Where gas is used, the application of the burner may be limited to a territory having a gas supply, although it can be used with gas supplied in containers. Under average conditions the cost of ignition with gas is slightly greater than with electricity.

Automatic Burner Controls.

A room thermostat is used to indicate and control the operation of the burner so as to maintain the desired temperature between a limiting plus or minus two degrees.

The boiler or furnace control is to control the operation of the burner so as to prevent overheating of the boiler or furnace and in the case of steam boilers to prevent the development of abnormal pressures.

A safety control is provided to establish a time limit within which the oil must be ignited every time the burner is started and to shut the burner down in case ignition does not take place.

There are two systems of control instruments. The low voltage (15-20 volts) and the high voltage which is the voltage at which the motor operates, usually 110 volts. Both systems have been used with complete satisfaction and opinion as to which system is the best is evenly divided.

In order to obtain the best results from the thermostat it should be located with care. Most people prefer to have it in the living room. It should be located on an inside wall, about five feet from the floor at the breathing level, protected from abnormal drafts such as stairways or entrances. It should not be near chimney, radiators or registers, hot water pipes or steam pipes, or other sources of heat. Avoid concealed hot water or steam pipes.

Winslow Boiler & Engineering Co.

Makers of

Kleen-Heet

Present Burners for Every Purse.

Facts alone are important—then let's deal with facts alone.

The New Improved Kleen-Heet Challenger is steady, faithful, neat and noiseless. So noiseless that it cannot be heard six inches away! The whole construction is foolproof—and within the reach of every purse.

For those with larger homes or buildings, the 800 series meets their needs. Beyond a doubt, it is the best equipment money can buy.



Now the IMPROVED CHALLENGER
—for average-size homes; the simplest and most silent of all automatic burners—at a new low cost level.

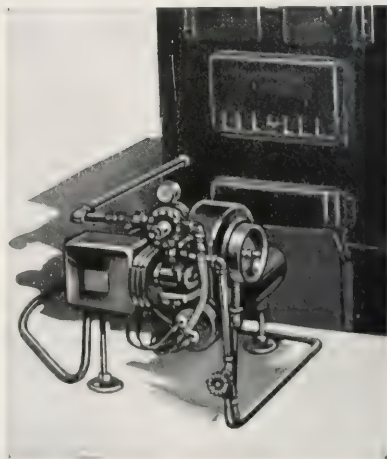


Write for your copy of report by
Investigating Committees of
Architects and Engineers.

Kleen-Heet

844 Rush Street
CHICAGO, ILLINOIS

{ Every KLEEN-HEET
burner is, of course,
listed as standard by
the Underwriters'
Laboratories. }



KLEEN-HEET "800" series model
—the acknowledged de luxe in oil
heat, regardless of price—for all
heavy duty, fully automatic heating.

To make the operation of the thermostat effective, it is necessary that the radiation installed in each room be carefully proportioned, so that the desired temperature in each room will be established, when the room in which the thermostat is located is at the correct temperature.

The majority of the burners operate on the intermittent principle, but there are a few that operate on a system known as high-low, where the burner is continuously operating, the flame intensity being buried to meet the temperature variation as indicated by the thermostat. There is considerable discussion among designing engineers as to the relative merits of the two systems, but as the high-low may have a slight advantage during colder weather the intermittent would be more economical during the mild weather, so that over the entire heating season, the total amount of fuel will be very nearly the same.

There are many satisfactory boilers that can be used with oil heating equipment some of which were designed for burning coal while others have been designed for oil. In selecting a boiler for use with an oil burner, make sure that it has long flue passes and that the combustion gases are not short circuited from the combustion chamber to the stack outlet.

tions as the boiler is often neglected. The automatic heat features eliminate the necessity of daily inspections of the boiler room.

For warm air installation, welded steel furnaces are more suitable, although very satisfactory installations are made in cast iron furnaces. Where cast iron is used, care should be taken to see that all joints are tight. It is also recommended that this inspection be made at the beginning of each heating season.

By using an indirect heater in connection with the boiler, and a suitable auxiliary control for the hot water storage tank, a very satisfactory hot water supply can be had summer and winter at a reasonable cost. Separate oil burning hot water heating units can be used also to advantage.

Installation.

Installations should always be made by trained men under the direction of the burner manufacturer as every burner has peculiarities that should be given consideration when the installation is made. It is also important that the burner should be correctly adjusted for each installation as a greater loss in efficiency often results from poor adjustment rather than from poor design. A burner should have sufficient capacity to develop full rating of the boiler and it is preferable that it have some excess; it should also be

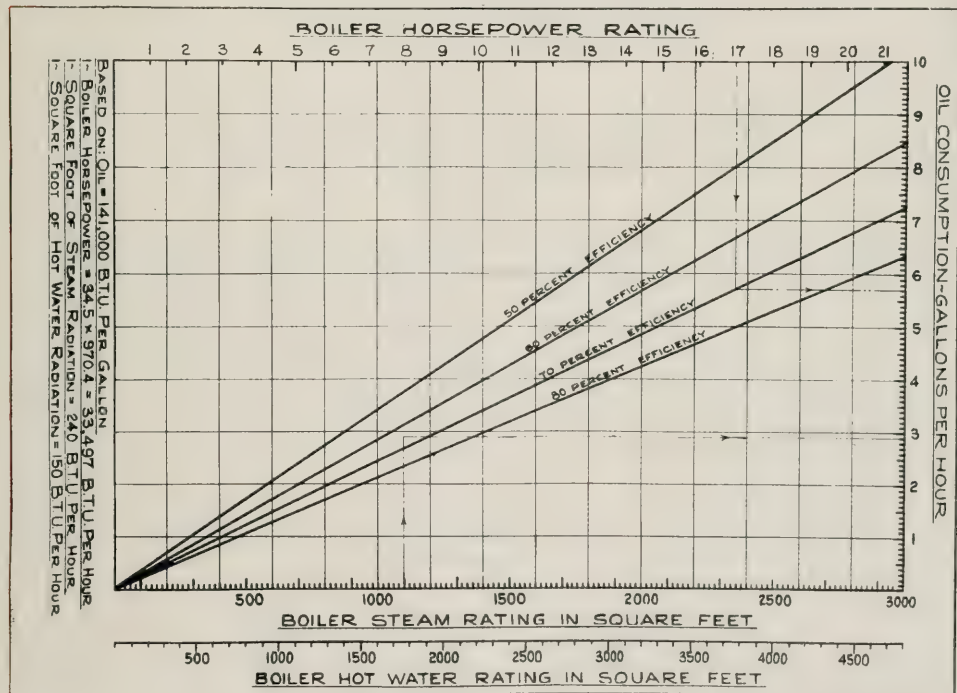
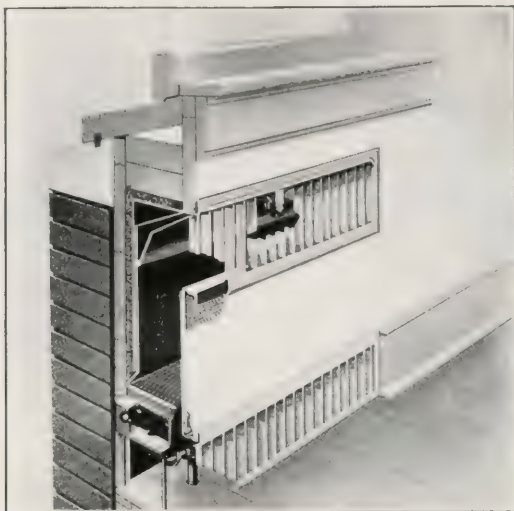


Fig. 1.

In applying oil heating equipment to existing coal burning boilers it is often advisable to baffle the passes in order to increase the travel of the hot flue gases and also to keep them in closer contact with the heating surface. In fire-tube boilers it is often desirable to use retarders inserted in the tubes so as to give the flue gases a spiral motion and keep them in contact with the surface of the tube.

An automatic feedwater regulator should be included for hot water or steam installa-

adjustable over a range from 50 to 100 per cent rating. See Fig. 1. The flame adjustment is best determined by a flue gas analysis but a good check can be made by noting the color of the flame. A white flame indicates excess air or insufficient oil, a red smoky flame insufficient air or excess oil, and an orange flame just tipped with red indicates an efficient and clean combustion. The boiler room should be well ventilated so that the burner can obtain an adequate supply of fresh air at all times.



Cutaway view of Trane Concealed Heater installation

ARCHITECTS OF TODAY *Specify* TRANE CONCEALED HEATERS

Trane Concealed Heaters, because of their ease of installation, find favor with architects and builders. The Heating Contractor simply slips the heater between the studding, adjusts the top boot to the proper height, makes the two piping connections. Then the installation is ready for plastering.

Non-ferrous metal fins connected to steam-carrying tubes form the durable heating element. Trane Concealed Heaters can be used on vapor, vacuum, or hot water systems with equal facility.

*[Bulletins and architectural drawings
showing application to different types
of walls will be furnished on request.]*

THE TRANE COMPANY

Branches in all principal cities.

LA CROSSE, WISCONSIN



In addition to the Concealed Heater, The Trane Company manufactures Heat Cabinets, Unit Heaters, Blast Heaters, Heating Specialties and Pumps.

Chimney Design.

Although slightly less draft is required for oil heating equipment and a smaller area would suffice, it is recommended that the chimney be designed to meet the boiler manufacturers' specifications. It is preferable to have the oil burner flue isolated from the other flues of the house as this may be helpful in preventing any mechanical sound from being transmitted to the rooms of the house. A well designed chimney is as important for an oil burner as it is for a coal fired heating plant.

Oil Specifications.

The uniform oil specifications of the American Oil Burner Association classify fuel oils according to the following table:

Table 1. Fuel Oil Specifications.
(A. O. B. A. Standard)

Oil No.	Name	Approximate Gravity Range Baume
1	Furnace Oil—Light	(36°-40°)
2	Furnace Oil—Medium	(32°-36°)
3	Furnace Oil—Heavy	(28°-32° and 25° Pac. Cost Diesel Oil)
4	Fuel Oil—Light	24°+
5	Fuel Oil—Medium	18°+
6	Fuel Oil—Heavy	14°+

The furnace oils are used primarily for domestic purposes and do not require pre-heat-

lower price and higher heat contents frequently justify their use.

Fig. 2 gives the heat contents of various quality oils, per pound and per gallon.

Domestic Fuel Oils.

Furnace oils, Nos. 1 to 3, are those used for domestic heating installations as they are available in most territories and they do not require pre-heating. They are suitable for installations requiring up to 15 gal. per hour, or more, in districts where heavy oil is not available. Burners should be selected that will satisfactorily handle the grade of oil available and owners should be advised to employ only the grade of fuel for which the burner is designed, except that a lighter grade than the one specified, can be used in most any type of burner.

Comparative Costs.

Comparative cost figures for various fuels depend entirely upon the heat content of each fuel and the efficiency with which each is utilized. With oil it is reasonable to assume an increase in efficiency of 10 to 15 per cent over coal. Charts shown in Figures 3 and 4 give comparative consumption of oil against seasonal coal or gas requirements. These figures are based on an oil containing 141,000 B. t. u. per gallon. By referring to Fig. 2, these figures can be corrected for other grades of oil.

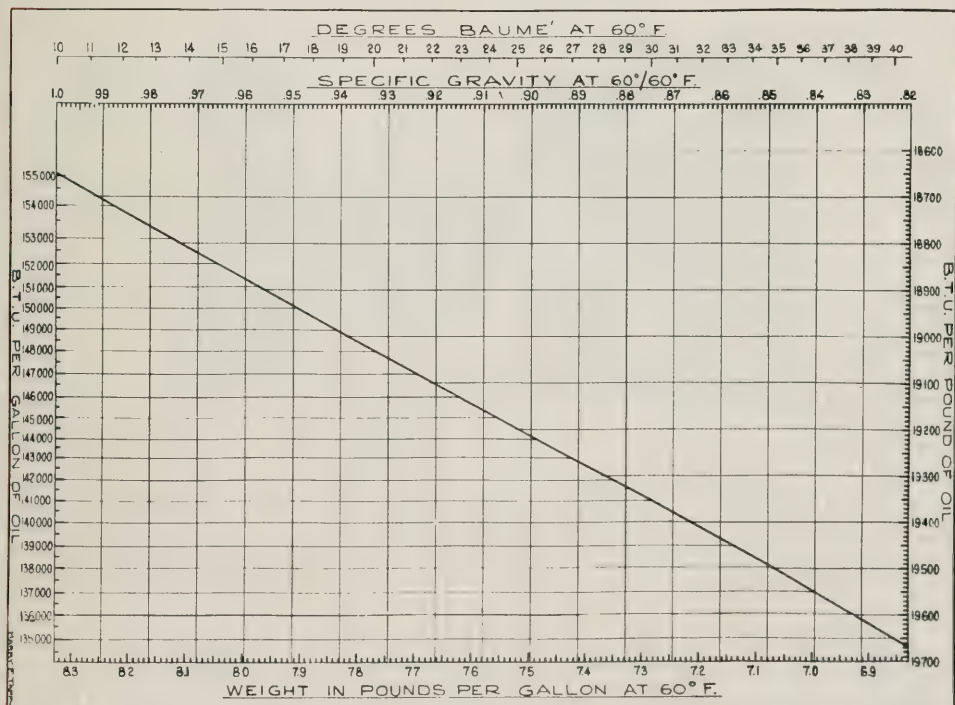


Fig. 2.

ing. The fuel oils with the exception of No. 4 are viscous at normal temperatures and require pre-heating for satisfactory operation. For commercial oil burning oil No. 6 is used when available because of its higher heat content and lower price. Installations for the heavy oil and the labor to operate cost more than those for furnace oils but the

When larger installations are made, such as in apartment houses and office buildings, the saving in labor, effected by the use of oil, will offset considerable increase in the cost of the oil over the cost of the coal. This saving in labor permits oil heating equipment to be installed, with its advantages of storage, handling and cleanliness, and oper-

LAMMERT



OIL BURNERS

The thought and energy of Lammerts' Engineers are directed toward very definite goals which they have reached very successfully. The whole effort is to produce equipment and installations of extremely long life and low maintenance, combined with highest operating efficiencies. This is true economy as well as correct engineering. That is why Lammert Oil Burning Installations help build good will between the architects and their clients.



A sound, reliable Chicago organization with its factory and engineering force right in Chicago, Backed by forty years of power plant experience with the largest power plants in this territory. Built and installed to maintain a reputation which is already of sterling value. Our engineers are glad to be of service to you. Call for them.



Home, Apartment, Hotel, Institution or Factory



LAMMERT AND MANN CO.

1751 Walnut Street

CHICAGO, ILLINOIS

Established 1892

O-E Specialty Manufacturing Corporation

Manufacturers of

O-E Vapor-Vacuum and Hot Water Heating Specialties



1710-1712 St. Paul Avenue
MILWAUKEE, WISCONSIN



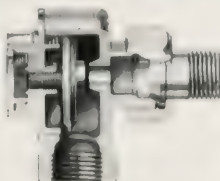
Representatives in all Principal Cities



O-E Improved High-Grade Packless Supply Valves for Vapor, Vacuum Steam or Hot Water. Furnished in the following patterns: Lock Shield, Globe Straight Way, and Right and Left-Hand Corner.



The O-E Ball Check Water Seal Condenser Return Fitting with adjustable air vent, and O-E Air Exhauster and Vacuum Valve with the O-E Graduated Packless Supply Valve are designed for the O-E "3-in-1" Vapor-Vacuum-Pressure System, simplest and most flexible heating system ever devised. Send for Bulletin "K."



Interior view No. 1 and No. 5 O-E Thermo-Nickel Return Traps for vapor, vacuum or pressure heating systems. Guaranteed to remain closed

on a vacuum pump system. Thermal members practically indestructible.



O-E No. 7 Vacu-Quick Vent cast in brass, thoroughly sandblasted, heavily nickel plated. Large free opening assures quick venting and the specially constructed vacuum check absolutely prevents the return of air in the system. Made in 1/2" I. P. size.

O-E Float Drip and Blast Traps are highly efficient, positive in action, and entirely dependable for dripping low or high-pressure steam mains risers, vent coils, etc., without the loss of steam. Made in sizes 1/2" to 2".



O-E No. 2 1/2 Direct Differential Boiler Return Trap is infallible for returning condensation to boiler on any vapor-vacuum one or two-pipe gravity steam heating systems. Capacity 4500 sq. ft. direct radiation. Pipe connections 2", steam 3/4", air vent 1/2", No. 4 with outside mechanism, 3500 sq. ft. No. 5, 6500 sq. ft. No. 6, 9250 sq. ft.



O-E Vacu-Float Vents made in two sizes, 3/8" No. 15 and 3/4" No. 30. Vents quickly and freely close against water or steam.



O-E Venturi Hot Water Circulation Fitting for domestic hot water system. Obviates necessity of circulating pumps.



In addition to the above O-E Specialties, we also manufacture O-E Compound Vacuum Pressure Gauges, All-Metal Damper Regulators, Frost-Proof Fittings, Dirt Strainers, Thermo-Nickel Air Line Valves and Automatic Air Valves and Vents. DATA PERTAINING TO ANY OF THE ABOVE SPECIALTIES CHEERFULLY FURNISHED ON REQUEST.

ated at an equal cost with the coal fired installation, even though the actual cost of the oil may be more than the cost of the coal.

Tank Installations.

Tank installations should always be made in accordance with local regulations, or in absence of these, the regulations of the National Board of Fire Underwriters should be followed. Copies of these regulations may be obtained from the Underwriters Laboratories, 207 E. Ohio Street, Chicago, Illinois. These latter regulations permit the oil to be fed by gravity from an exposed 275 gallon inside storage tank, if desired, and proper precautions are taken to prevent an abnormal flow of oil. Inside tanks should be installed on non-combustible supports and located at least 10 feet from the boiler or furnace. In

must be vented and they should be located so that the fuel line terminal is near the drive, or curb, so as to facilitate delivery from the tank truck.

When locating a tank it should be kept near the drive or curb so that the oil can be delivered through a hose from the delivery truck tank.

Architects' Counsel to Clients.

A proper appreciation by the home and building owner of the nature of his oil heating equipment, its capabilities and limitations, and the care it will require, will do more than anything else to assure satisfying results, once a correct installation has been made. The essential points for the client are summarized here:

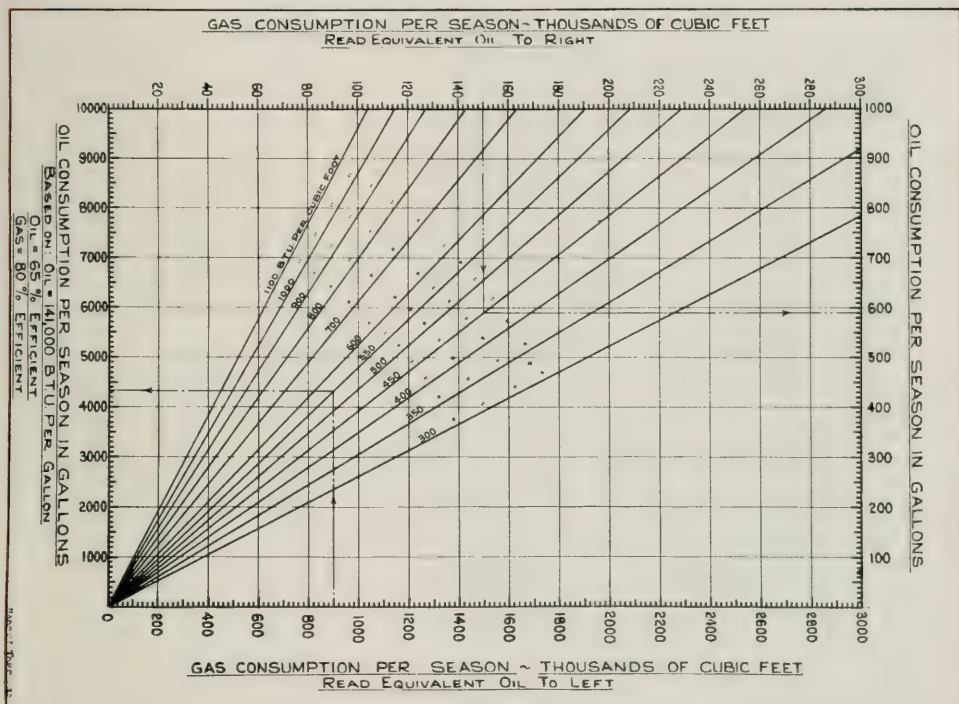


Fig. 4.

some localities it is permissible to install two 275 gallon tanks with a three-way valve in the feed line connecting the two tanks, permitting gravity feed from either tank. This type of installation has many advantages and is rapidly coming into favor with local authorities having jurisdiction over the installation of oil heating equipment.

For larger homes, a very desirable installation is with an outside buried tank of at least 1100 gallons capacity. Where it is impractical to locate this tank below the level of the burner, it is necessary to use some means to prevent the siphoning of oil from the tank, in case of a break in the fuel supply line. There are several devices for this purpose approved by the Underwriters' Laboratories. The use of a large buried tank eliminates the necessity of constantly watching the fuel supply and in some cases, will permit the purchase of fuel at the price, enough lower, to pay for the difference in installation cost. All tanks should be provided with a direct reading gauge to give a constant check on the amount of fuel on hand. All tanks

1. Oil heating equipment functions only to provide heat. It will not take care of the water level in the boiler. It will not operate when the current is shut off, nor when the fuel is exhausted. The entire plant should have regular inspection to see that these conditions are correct.

2. Oil burners are machines requiring reasonable care, oiling of moving parts and occasional cleaning. In this respect they are like clocks, automobiles, fans and electric refrigerators.

3. Oil burners are subject to adjustment like all other machines, and operate best when perfectly adjusted. Expert service men can make the occasional adjustments far better than a layman or ordinary mechanic.

4. Once the correct adjustments are made, they can be disturbed only by the following methods:

(a) Manually, as when someone attempts to interfere with the automatic operation of the burner, or to adjust the parts. Leave the apparatus alone, except for regular inspection, oiling and cleaning.

STEARNS IMPROVED INCINERATORS

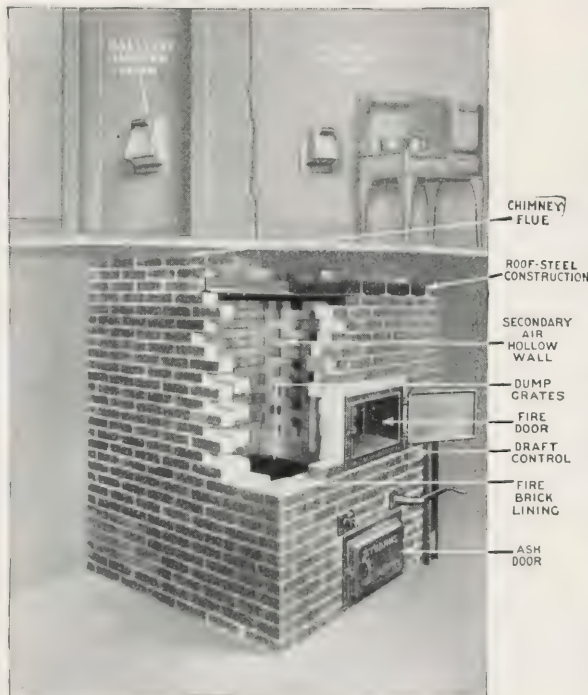
Surface Burning—Draft Controlled—Incinerator Equipment

We Have a Type for Every Purpose

The Stearns Incinerite Incinerator, manufactured since 1910 and recognized as a superior product, scientifically constructed, continues its leadership in the incineration field with the new improved design of the **SURFACE BURNING, DRAFT CONTROLLED UNIT** shown below.

The line is complete and offers types and sizes suitable for installation in Residential, Apartment, Hospital, Commercial and Industrial Buildings.

Outstanding features never before combined in the construction of incinerator equipment provide a sanitary and efficient solution of the problem of garbage and waste disposal.



Built-In Type Installation

Capacities of machines are listed up to Two Ton Per Hour consumption. **FLUE FED, HEAVY DUTY DESTRUCTOR**, Portable Gas Fired, **WALL** and **Kerosene** type units are available. Our Engineering Department will gladly furnish you detail regarding any specific problem you may have in mind, without obligation.

Complete catalogue furnished upon request.

Stearns Incinerators are sold in the Middle West by the

M. M. CONNOLE COMPANY

123 W. Madison Street, Chicago, Ill.

Phone Randolph 4780

Stearns Incinerator Inc., Syracuse, N. Y.

FEATURES

GRATES DUMPING and STATIONARY TYPE, of heavy design, individually set. **Duplex SECONDARY AIR CIRCULATION** is assured through the construction of a special chamber.

DRAFT controlled by regulating device installed in the front of the chamber.

RECTANGULAR AREA above the grates permits a **SLOW BURNING OF MATERIALS** instead of a fast fierce fire, assuring complete odorless combustion of the waste materials.

HOPPER DOORS for installation in the chimney are furnished in three sizes, small, medium and large.

Special Chimney screens and settling chambers are furnished when required.

(b) By changes in fuel. Stick to the same grade and quality of fuel, or have a service man readjust the burner when changes are necessary.

(c) By presence of foreign matter—particularly in the fuel.

(d) By natural wear. Periodic inspections will take care of these changes.

(e) Automatic operation does not permit neglect. Give to your heating apparatus the reasonable care and attention any mechanical equipment requires.

The reasonable suggestions, if followed, will assure the maximum benefits and lowest operating costs to the owner.

These suggestions are nearly all given from the view point of domestic and small commercial building installations because this is the most active field at the present time. If further information concerning special problems of oil heating installations is desired, it may be obtained by writing to the American Oil Burner Association, 420 Madison Avenue, New York City.

Outline of Architect's Specifications.

Covering the Installation of Oil Heating Equipment.

Scope of Contract.

These specifications cover the complete installation of an oil heating apparatus and fuel oil storage system, for the boiler installed in The apparatus shall consist of a oil burner, fuel oil storage tank (tanks); room thermostat, boiler control, burner safety device, necessary and adequate installation of refractory lining in the combustion chamber of the boiler; all necessary piping, valves, electric wiring, switches, etc., all tested and ready for operation.

The oil heating installation shall comply with all local ordinances (or rules of National Board of Fire Underwriters), and must meet available electric current facilities.

Liability.

The contractor shall assume, etc., etc.

Completion of Work and Payment.

The work is to be completed, etc.

Materials.

All materials, etc. (recommended furnished by contractor.)

Cutting and Patching.

The contractor shall do all, etc.

Cleaning up.

The contractor shall promptly, etc.

Additional Data.

All visible piping and scratched places will be painted to match other new similar adjacent material.

Oil Burning Apparatus.

The contractor shall furnish, make all necessary changes in the boiler (or furnace) and install, one completely equipped..... oil burner, etc.

Fuel Oil Storage.

The contractor shall furnish and install (one gallon inside) fuel oil storage tank. Tank shall be manufactured, test-

ed and installed in accordance with local regulations (or rules of National Board of Fire Underwriters).

Piping.

Piping shall be installed in accordance with local regulations (or rules of National Board of Fire Underwriters).

Wiring.

All wiring shall be done in accordance with the National Electric Code, and local regulations.

Thermostat Control.

The thermostat shall be installed in room, five feet from floor, removed as far as is practical from any and all warming influences such as radiators, hot water pipes, etc., or possible cooling drafts.

Warm Air Furnace Control.

Furnaces shall be equipped with thermostatic warm air jacket control, wired in connection with room thermostat.

Boiler Control.

A maximum pressure or temperature control shall be installed in the boiler according to manufacturer's printed instructions. This control shall be wired so as to automatically prevent creation of excessive pressure or temperature in the boiler.

Burner Safety Device.

A burner safety device shall be installed in connection with the burner, so designed as to make the burner inoperative if for any reason the burner does not function properly.

In General.

The omission from these specifications of any minor detail of construction, installation, material, specialties, etc., shall not relieve the contractor from furnishing same in place complete, and such omissions shall not entitle contractor to make claims or demands for extra materials or labor. However, in the event that unusual water is struck or if quicksand, rock or other unusual obstructions are encountered, the contractor shall proceed with the necessary special construction that is involved for which the contractor will receive sum equal to the actual cost of such special work plus per cent. The word "cost" as hereinabove used shall be understood to consist of actual field cost and overhead.

Adjustment.

The contractor shall agree to provide free inspection and adjustment of the oil burner installation for the first ninety days of the heating season during which the installation is made. The heating season shall be considered as beginning September first for installation made during the summer.

Guarantee.

The contractor shall guarantee to make good by replacement or repair, any original defects in parts, material or workmanship previously specified or described; provided that this obligation is assumed only in the event that written notification of such alleged defect be given the contractor within a period of one year after said equipment has been installed.

McQUAY

Cabinet

RADIATOR



The Cabinet is now built of rust-defying copper alloy steel. Another McQuay advancement

The modern McQuay is *more* than an attractive radiator. It dispenses healthier, moistened heat quicker, with a decided fuel saving.

The tube and copper fin heating unit is the most efficient medium known for transferring heat. And the heated air is sent out **in a horizontal direction** with sufficient initial velocity to circulate it completely—heating rooms far more quickly and preventing soiling of walls and drapes.

Due to this complete circulation, and the greater heating effectiveness of moist air, rooms are kept comfortably warm with lower radiator temperatures — materially reducing heating costs.

Honestly Rated

McQuay radiators are accurately rated. They will heat every bit of the

capacity guaranteed by their catalog ratings.

Weigh Less--- Occupy Less Space

A 50 square foot McQuay weighs about 75 pounds. You can tuck it under your arm. That cuts freight, handling and installation costs.

McQuay Radiator Corporation 35 East Wacker Drive
CHICAGO

SUGGESTIONS FOR OPERATING A TYPICAL LARGE HIGH SCHOOL HEATING AND VENTILATING PLANT

DESCRIPTION OF THE PLANT.

There are two smokeless downdraft firebox boilers. There are separate supply fans, one for the auditorium-gymnasium, and one for the balance of the building. There are doors in the supply duct under the auditorium, permitting separate heating of either auditorium or gymnasium, or simultaneous heating of both.

The boilers are intended to be operated at about ten pounds steam pressure, discharging the steam through an automatic pressure reducing valve which will maintain a uniform pressure on the heating system of about one pound. This pressure may be increased for cold weather and reduced for mild weather, by adjusting the weights on the valve. It permits considerable boiler pressure fluctuation without changing the pressure on the radiators. The direct radiation is not to be depended upon entirely for heating in cold weather. The fans and indirect radiation should be used to help. It is better to heat the building quickly, using all the power we have, then to take a longer time, using only part of the power. The plant is not designed to heat the gymnasium and auditorium without the use of the fans.

A system of temperature regulation is installed, with manual-pneumatic operation of the vent outlets in the roof, with separate remote control for those from the main building, from the auditorium and from the gymnasium.

None of these dampers will open unless compressed air is available to open them. When the air compressor is shut down, all outlet dampers will close, regardless of the position of the switches which control them. If anything goes wrong with the air compressor, therefore, the dampers should be propped or tied open until repairs can be made. When using the auditorium in warm weather the air compressor should thus be operated.

TERMS.

Cold Air Intakes—through which the supply air is supplied to the fan room and building.

Tempering Heaters—the indirect heaters between the cold air doors and the fans. Their function is to temper the cold incoming air to a temperature which will promote comfort in the rooms, say 70 degrees. The tempered air should never be cooler than 65 degrees, lest drafts will be complained of.

Volume Dampers—The hand-controlled dampers in the supply flues for regulating the volume of air sent into each room. When once set properly they should never be disturbed. They are in most cases operated by chains concealed behind the diffusers. Pulling the chain up closes the damper.

Thermostats—located on side walls of school rooms. They are instruments with a heat-sensitive element, which is influenced by the rise and fall of the temperature of surrounding air to actuate a small valve in a pipe leading from a compressed air supply tank in the basement to valves or dampers which control the heat in the rooms. When the air compressor is shut down heat automatically is turned on at all radiators and air ducts.

Vacuum Pump—This is an electric centrifugal pump, and it exhausts the air from the radiators and discharges the water condensed in the radiators back into the boilers.

Suction Strainer—This is at the entrance to the vacuum pump. It has a wire screen

for catching scale, etc., and keeping this out of the pump.

Drainage Outlet—Near the suction strainer, in the main return there is a gate valve and a swing check valve with outlet visible. This is for discharging all condensed water to the sewer, in case of trouble with the vacuum pump, and for use when draining the pipes. This will not open when there is a vacuum on the return system.

HUMIDITY CONTROL.

Is automatic, whenever the air compressor is operated and steam is turned on. To prevent damage due to excess uncontrolled humidity, the pneumatic valve in the steam pipe to the humidifier is always closed unless compressed air pressure is available to allow the humidity controller to function. If much dew and mist is visible on the class room windows, the humidity is excessive and the controller should be adjusted to reduce it.

ENGINEER IN CHARGE.

One trained man should be in charge of the mechanical apparatus. Manufacturers of the machinery will be glad always to give advice about its care and operation.

Tenants of the building should not adjust thermostats, valves, or dampers, but in case of difficulty should send for the engineer.

OPEN WINDOWS AND DOORS.

There is no prohibition against opening windows. Such opening of windows is usually healthful and desirable, and does not harm the heating plant except as it may cause some waste of fuel when windows in leeward rooms permit undue passage out of warm air.

Opening both corridor doors and class room windows is objectionable, because it usually has no effect on the particular room, but does drain the other rooms which may have open corridor doors. In general corridor doors and transoms from class rooms should be kept shut, and windows may then be opened as much as the teacher pleases.

BOILER CARE AND OPERATION.

Each boiler is fitted with manhole and handhole plates. The handhole plates should be removed every few months for cleaning out any dirt or sediment that may settle in the water space.

Do not remove the manhole plate on top of the boiler unless it becomes necessary to make internal repairs to the boiler. If, in removing a handhole or manhole plate the gasket is found defective, new gaskets should be installed. Extra gaskets should always be kept on hand.

Before starting the fire after a vacation period, let clean water run through the boiler for a while—enough to wash out all water of dirty or rusty color. Then fill the boiler to the waterline, closing the blowoff cocks tight, and start the fire.

When shutting down for the vacation, wash the boiler in the same way and remove all manholes and handhole plates so that there will be a free circulation of air through it. A small kerosene burner stove or coal oil lamp should be lighted and placed on the lower grates to dry out the moisture.

The grate bars are made to rock and dump. When at rest the top of the grate bars should be perfectly level. If the fingers of the grate are left sticking up in the fire, they may burn off or be broken when the poker is used to dislodge a clinker.

B. & F. HEATING & VENTILATING CO.

Contractors and Engineers

Telephones State 2700-2701

228 N. La Salle Street

CHICAGO

Do not allow ashes to accumulate in the ashpit. If ashes ever touch the grates with a hot fire above, someone must usually buy a new set of grates, and the careless fireman ought to be that man!

If a clinker gets caught in the grate, do not try to force it out by extra exertion on the shaker handle—dislodge it with the poker or clinker bar.

The fusible plug is located just below the waterline. It is made of brass with a core of softer metal which melts at a comparatively low temperature when not covered with water. Should the water through neglect or otherwise get below the safe limit, this fusible plug is supposed to melt and the steam and water blowing into the fire will tend to check the fire and give warning to the person in charge. In case of such fusing, cover the fire with ashes and put it out as soon as possible. Remove the old fusible plug (with an ordinary money wrench) and screw in a new fusible plug. Always keep an extra fusible plug on hand.

When you have the boiler open to clean it, scrape the inside of the fusible plug to remove any dirt or incrustation that may have settled on it.

The water gauge has a drain at the bottom of the glass. Open this occasionally and let the steam and water blow through to make sure there is no stoppage in the connections.

Always leave both valves on the glass water gauge open unless necessary to close them temporarily to renew a gauge glass.

If you clean the gauge glass, use a string and a piece of waste; never use a wire or metal of any kind, as it will scratch the soft glass and result in a break, with possible scalding of the fireman.

All tubes and smoke passages should be kept very clean, as a small amount of dust or dirt in the tubes means a great waste of heat. The cleaner you keep the heat absorbing surfaces of the boiler, the more heat they can absorb, and you will save labor and fuel.

Clean the breeching and the dust pocket at the base of the chimney frequently.

Be sure of a supply of air for combustion purposes. Remember that you must have an opening into the boiler room, preferably from out of doors, fully as large as the breeching, to replace the large volume which the chimney must draw through the fire for combustion purposes.

Test the safety valve occasionally, to be sure that it is in operative condition. Blow off some of the water from the boiler say once a month, or oftener if the water gets muddy. It should not be necessary to use boiler compound, as ordinarily very little make-up water will be required. If there is a suggestion of pitting in boiler tubes or shell, blow off more frequently, thus using more water and perhaps gaining a protective layer of very thin scale on the boiler surfaces. Cistern or other soft water alone is bad for a boiler. Soft water must have enough hard water added to lend a protective scale-layer.

Keep the water line at around the middle gauge cock or between it and the lower gauge cock.

If the water ever gets out of sight in the glass, remember that the boiler is in danger, and without fail follow the following procedure:

Shut off the drafts.

Throw ashes on the fire or pull the fire out.

Do **not** turn cold water into the boiler, as it might crack a hot plate and cause an explosion.

Do not turn water on the fire in the boiler, as it will blow dust into your eyes and will fill the boiler room with steam.

Wait, no matter at what fear of blame, even if school must be dismissed, until you can bear your hand on the firebox top, inside,

before turning in cold water, and do not rebuild the fire until the water level is restored where you can see it.

FIRING.

In building a fresh fire on the upper grate put kindling in first, and place a small amount of coal on top, and then light the kindling.

In firing, under heavy load, remember to keep the fire **clean**,—that is, free from clinkers. To do this you will have to work over with a hook the entire upper grate area every two or three hours, and will find that this **pays** in labor and coal. The broken-up masses go on to the lower grate, in any event, where any remaining value in them is saved.

Firing this boiler is entirely different from firing an ordinary boiler. Having a clean fire on the upper grate, do not hesitate to throw in at once wheelbarrow after wheelbarrow full of coal, until you have eight to twelve inches thickness. A good fire in a boiler of this type is black on top, and burns from underneath. The lower or ashpit air inlets are to be nearly closed. The upper door is to be wide open; this is a down-draft boiler.

If you have followed this direction faithfully and have reasonably good run of mine bituminous coal, you can now rest for an hour or so and the boiler will develop at least one and one-half times its full rating without any attention during that time.

COLD AIR INTAKE DAMPERS OR WINDOWS.

Must always be open **wide** when fans are in operation. It should always be closed tight when fan operation is discontinued.

TEMPERING HEATERS.

These are for warming the entering air to about 70 degrees in the coldest weather. They are controlled by a duct thermostat which should begin to turn them off when the air temperature reaches that point. Most days are not very cold, but to save time and fuel we ought to use all the radiation we have and so heat quickly prior to arrival of the occupants of the building. Therefore the compressed air switch near each tempered air duct thermostat is provided and should be kept open until the building is occupied, as when so opened it by-passes the thermostat and causes the entering air to get as hot as we can get it.

In very mild weather, and on some chilly days, after the first hour or so of operation, when the building gets warm, it is sometimes necessary to help the duct thermostat by shutting off the hand operated steam valve for part of the tempering heater, since so great an amount of radiation cannot always be controlled by the thermostat quickly enough to prevent overheating or drafts. Remember in this case to shut off an inner section rather than one first touched, by the freezing air, since an outer heating section might have enough water in it to freeze and burst it, while an inner heating section would be protected against freezing by the warm ones outside of it.

RADIATORS.

They will get hot if the supply valves are open and if the vacuum traps are operating. You can check up the former by feeling the pipes on each side of the radiator valves. If the trap is at fault, close the supply valve and remove the trap bellows. It may be gummed up with the grease or the bellows may be broken. New bellows may be obtained from the manufacturers.

VACUUM PUMP.

Always operate the pump when heating the building. Start it before you turn steam on to the mains and always run it for some time after you shut steam off, so as to get all condensation which might freeze out of the radiators.



Foreman National Bank Building, Chicago
Graham, Anderson, Probst and White, Architects

ASBESTOS and 85% MAGNESIA PIPE and BOILER COVERINGS, CORK INSULATION
and BRINE PIPE COVERINGS, SMOKE-STACK and BREECHING LININGS

PAUL J. KREZ CO.

HEAT AND COLD INSULATION

DISTRIBUTORS OF

Asbestos "Century" Shingles - Asbestos Building Lumber

442 - 444 NORTH LA SALLE STREET

Telephones Superior 1329-1330

MEMBERS OF BUILDING CONSTRUCTION EMPLOYERS' ASSOCIATION OF CHICAGO

In case of trouble with the pump you can operate the plant, using city water supply and wasting the condensation to the sewer.

The automatic control of the vacuum pump should be maintained in perfect condition. Repairs and instructions can be obtained quickly from the manufacturers.

HOT WATER HEATING.

Is by a steam radiator submerged in the steel tank and controlled by an independent thermostat. It is intended ordinarily for the condensation from this heater to be trapped to the vacuum return, and it would be possible to lower the heater to a point near the boiler room floor and eliminate entirely any gravity operation, valves for which, however, are provided. The flanged head of this heater should be opened every year and the scale on the copper tubes should be removed.

BOILER MAIN VALVES.

Each steam take-off has a valve. Each header drip, each city water connection and each return has a valve and a swing check.

If you have steam on both boilers and wish to shut one boiler off—

Always close the return valves of the boiler you wish to shut down first, then close the main steam valve on the boiler you wish to shut down.

If you have steam on one boiler and wish to operate both—

First the shut off boiler until the steam pressure is within two or three pounds of that in the other boiler, then open the steam valve first slowly, and then open the return valve. Always close a return valve on a boiler first, and the corresponding steam valve last, and always open a steam valve first and open the corresponding valve last.

TEMPERATURE REGULATION.

The automatic temperature control depends first upon the air compressor, and it must always be kept in operation when the heating plant is in use. Keep this air compressor well oiled, and see that it maintains constantly an air pressure of 15 pounds per square inch on the regulation system. The gauge will indicate this, and if the pressure becomes materially less, the pump should be looked after immediately. If the air pressure does fall, the first thing to do is to decide whether the trouble is in the compressor or due to a leak in the system. Shut off, therefore, the stop-cock that you will find between the pressure gauge and the air main leading to the system, and see whether the pump will then maintain 15 pounds. If it does, it will show that a leak in the system has occurred, and you must immediately locate and repair it.

It is important that the tempered air be maintained between 68 and 75 degrees, and you must not heat during occupancy any more tempering surface than is necessary to maintain that temperature. The thermostat in the tempering chamber should control the valves on the tempering heaters and keep the tempered air uniform.

IF A ROOM OVERHEATS.

Look everywhere else for the trouble before you touch the thermostats. The heat may come from some cause that is not under the control of the thermostat. If convinced that the automatic regulation is at fault and that the thermostat is properly set, look at the radiator valves belonging to the room. If you find them closed, the thermostat is doing its duty. Perhaps your tempered air may be a little too warm, possibly because you have too much tempering surface in use. Be sure that the volume damper in the flue has not been accidentally closed. If the valves are not closed to the steam, it will then be evident that the trouble is with the regula-

tion, and the manufacturer of it should be notified immediately.

FOR A COLD ROOM.

Is plenty of air entering? Is it hot?

Are the radiators hot all over?

It may be that you are not using enough steam on the tempering heaters, or they may be air-bound so that you are not getting their full efficiency. If the dampers and valves are calling for heat, that is all the thermostat can do. If it does not open the valves and turn on steam when the room is cold, however, it is then evident that the thermostat is at fault and the makers of the same should be notified. Do not be afraid to get a ladder and climb up in front of the air inlet so that you may learn for yourself whether or not the air entering the room corresponds with that indicated by the action of the thermostat. Be sure that the radiator traps are working properly.

TO START ON A COLD MORNING.

1. Get steam pressure of from 2 to 5 pounds on the entire plant, operating the vacuum pump, with every radiator hot and every section of the tempering heaters hot.

2. Open the vent outlets through the roof.

3. Open the supply air doors full area. Never curtail the amount of air.

4. Start the fan—always run it full speed.

Have the tempered air about 85 or 90 in zero weather (as hot as you can get it) until the pupils arrive or the rooms all reach 68 degrees, then reduce the tempered air to about 70 degrees or cooler.

SHUTTING DOWN AT NIGHT.

After banking the fire, close the main stop valve on the boiler steam supply and allow the vacuum pump to run until all water is drained from the system.

If the main stop valve is left open at night, the vacuum pump should be allowed to run also, so that the vapor which is passed from the boiler and condensed in the mains, etc., may be returned.

CARE AND MAINTENANCE OF BUILDINGS.

One of the most difficult problems that an Architect has to contend with is the proper care and maintenance of plants installed in buildings designed and built under his supervision.

Unintelligent care renders ineffective the most efficient plant. Generally speaking, it is fair for the Architect to assume that plants and buildings which he designs will not be cared for intelligently. It is hard for the average owner to understand that money invested in intelligent operation offers a particularly large return.

To overcome to some extent the problem of unintelligent operation, it is expedient that the Architect on the completion of his jobs have prepared a statement of the intent and purpose of the various apparatus installed and minute detailed description of proper methods of operation. Such instructions should be worded in the simplest fashion possible so as to be intelligible to the simple mind of the average janitor.

The following article by Samuel Lewis entitled "Suggestions for Operating a Typical Large High School Heating and Ventilating Plant" is a good illustration of the type and method of presenting information to a client regarding plant operation.

These instructions should not be confined exclusively to the mechanical plant, but should extend to the matter of care of floors, woodwork, painting, furnishing, decorating, and various materials to the end that fine material shall not be destroyed by unintelligent care.—Editor.



Central Asbestos and Magnesite Company

Manufacturers and Contractors for
PIPE AND BOILER COVERINGS
SMOKE STACK AND BREECHING LININGS
MAGNESIA AND ASBESTOS PRODUCTS
HAIR FELT, MINERAL WOOL, ETC.

214-216 West Grand Avenue, Chicago

Telephone Superior 3533

COOLING THE AIR IN FACTORIES

By Samuel R. Lewis.

Nature's method of cooling almost all things which get warmer than their surroundings and which should be cool, is to allow water to evaporate. The work of evaporating the liquid water into vapor which can be carried off with the air, requires a very considerable amount of heat. This heat is extracted from the surface nearest to the water. Thus we see white frost on the surface of green things on spring mornings.

When the sun declined the evening before and ceased to furnish radiant heat, the ground, buildings, trees, etc. no longer transmitted this heat back to the air, and the air consequently contracted in volume. It was thus no longer able to carry its full burden of moisture, due to its contracted condition, and was compelled to lay this moisture down on the leaves and the roofs and the ground.

I suppose, except for this daily phenomenon of the dew, there would be few insects and small animals except along streams, as apparently the little fellows depend on the dew for their necessary water supply.

Getting back to the frost, there are many nights when the temperature of the air fails to reach a frigidty harmful to plant life, but following which nights, we can see white frost everywhere. I believe that on such nights the frost does not appear until near morning, perhaps at sunrise, when the air begins again to pick up its burden of moisture, with the consequent sudden temperature drop caused by the heat absorption when the dew-water is changed to vapor. The hoar frost on such mornings does not endure for long, as the rising sun melts it quickly.

In this cycle, from a vapor to a liquid, we have the fundamental basis for all refrigeration and artificial ice-making.

From the great coolers at the packing-houses to the little machine under your pantry ice box, all use the same idea. All compress some gas into or toward liquid form, using heat or its equivalent mechanical energy, to such an extent as to cause the container to become warmer than its surroundings. This excess heat can then be removed by contact with the cooler surroundings, as by streams of air or water. As the excess heat is removed, the compressed gas loses pressure, and can never regain its pressure without regaining the heat which was removed.

Every automobile tire is a miniature refrigerating plant.

When you pump it up by hand not only does the party at the pump grow warm in temper and body, but the pump gets quite hot, and the tire itself is appreciably warmer.

Having a good pressure in the tire if you unscrew the valve and permit the air to escape, you can feel the decided drop in tem-

perature, in the vicinity of the orifice as the escaping air regains its heat.

In passing, it is now pretty clear that the life of a pneumatic tire has a very decided bearing on the ability of the tire to carry off to the exterior air the heat generated in its inside due to the pounding and beating of the interior air and due to the flexing and internal friction of tire structure. Anyone who has touched, immediately after stopping his car, the tire which gave way suddenly under driving, will remember how hot it was.

We have a chance then, to cool a factory by introducing mechanical refrigeration, as in your ice-box, or to cool it by using the less costly process suggested by the dew and the hoar frost.

However, we may cool the factory, we must, if we expect satisfaction, arrange to prevent too rapid a re-absorption of heat after the cooling has been effected. We would not get very far with cooling the butter and milk or with freezing ice in the pantry machine unless we had a good ice box.

We need for the factory, therefore, a warmly built structure, capable of reflecting the radiant sunshine and of keeping the heat out.

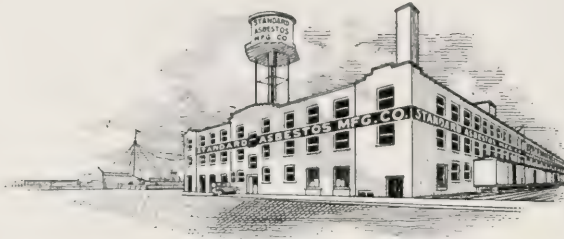
Such construction, of course, is a great factor in keeping the winter heat in, as well.

Recent observations with the Nicholls heat meter of the American Society of Heating and Ventilating Engineers indicated that on a warm sunny day the dark colored roof of the United States Bureau of Mines at Pittsburgh absorbed heat very rapidly from outside, but that if the roof were covered with a light colored paint or cloth, the heat inflow ceased, while heat flowed back outside from the attic which was warmer than the outside open air some little distance away from the hot roof.

It is calculated that a light colored or light-reflecting roof surface would reduce by some forty per cent the inflow of heat due to sunshine, with a roof having otherwise the same heat resisting qualities.

Character of wall construction has a potent influence upon heat transmission.

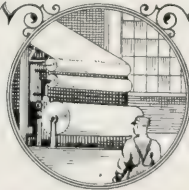
Dry wooden walls, built without hollow wall spaces are excellent non-conductors of heat. Hollow spaces between building studs permit local interior air circuits, more effective in carrying heat from one side to the other as their height is increased. There should be henceforward no such local air circuits allowed. They can be stopped by porous fireproof materials, several of which are available commercially. Spaces between rafters should be closed similarly, and such arrangements will give much cooler attics and top stories, as well as reducing materially coal consumption in winter.



ASBESTOS PAPER MILL
NORTH BRANCH — CHICAGO RIVER

Standard Asbestos Mfg. Co.

MANUFACTURERS AND CONTRACTORS OF
STEAM PIPE AND BOILER COVERINGS
ASBESTOS PAPER AND DEADENING FELTS



820-822 WEST LAKE STREET
CHICAGO

Telephone Monroe 6475



OFFICE AND SALESROOMS

Any surface much cooler than its surroundings, condenses the air which is in contact with it, and receives dew. Thus, cold water pipes especially in basements and especially in summer, drip startling volumes of water which they have extracted from the air.

In winter, with moist air and single-thickness windows this same dew-effect occurs and causes window-frosting, rotting of wood sash and rusting of metal sash. Using double windows with their dead-air chambers between the glass surfaces, reduces and usually prevents such condensation.

When mechanical refrigeration is used for cooling buildings the reduction in air-temperature is relatively easy, but cooling by such means is always accompanied by the difficult and expensive necessity of removing the moisture or dew which always goes along with the reduction in air volume. Thus, when we refrigerate a fur storage vault, the refrigerating pipes soon become self-insulated by the ice which accumulates upon them. Sometimes this is broken off by manual labor and carried out. More often the room is allowed to warm up quickly, sufficiently to melt the ice; draining out the accumulated water before it has time to be re-absorbed into the air. The most approved method is to chill the fur vault by indirect methods, using a spray of chilled water which comes in contact alternatively with air being recirculated through the vault by a fan, and with the cold refrigerating surfaces. The water being much colder than the air is gradually increased in volume by the dew which it absorbs; yet, being water and not quite ice, keeps the cold pipes from insulating themselves with frost.

The use of water-absorbing materials, such as salt or calcium chloride and other water-hungry materials for drying air has not been successful commercially, since the inevitable change of the moisture from a vapor to a liquid liberates heat.

The most successful method, therefore, for applying artificial refrigeration to air cooling, requires a water spray, a fan, a recirculating pump and a system of distributing ducts.

Cooled air is much heavier than warm air.

Given a room to cool, if the inlets and outlets are both at the floor, the cool air crosses the floor from inlets to outlets and the hot air stays up above it, little affected by the process.

Given a room to cool, if the inlet is at the top and the outlet at the floor, the cool air tries to fall to the floor and unless very carefully diffused with many well distributed inlets and outlets, still will short circuit.

If the inlet is at the bottom and the outlet is at the top, the warmer air constantly will be withdrawn and the room gradually will cool off. If however, there are any open doors or windows, the cool air will prefer to fall out through them, like so much water, and the upper part of the room will be warm.

Thus, a basement reached only by stairs from above, is usually a cool basement. It is easy to refrigerate such a room. When we cool with dry, cold air a multi-story building, we need tight doors at every story around all stairs and elevators or we find ourselves with one grand room comprised of the whole building, cool at the bottom and hot at the top.

Refrigerated buildings always should have double windows, and vestibules or revolving doors. At every opening of a low-down door we lose a great quantity of the relatively heavy cool air.

I know of one artificially cooled six story building. In winter the up-going vent flues have a strong upward draft. In summer, though still open, with the same fan pressure behind them they have no draft whatever, except an occasional down going one. The cool air, despite double windows and revolving doors, leaks out and the erstwhile vent flues are useless.

Nature's method of cooling overheated animals is based on the dew-phenomenon. Animals have pores, in the skin, as with man, or on the tongue, as with dogs, which exude moisture, the changing of which to a vapor when exposed to moving air, takes heat, resulting in surface cooling.

A stone house, having no damp-proofing in its walls to prevent carrying up ground-water by capillary attraction is always a cool house in warm weather, despite its bad reputation otherwise.

This is because of the evaporation constantly in effect on warm, windy days.

A factory in Buffalo, of which I am cognizant, has an exterior water curtain which can be used to wet down the walls and roof for fire protection.

It has been found that a great cooling effect in hot weather, if the air is not saturated with moisture, comes from wetting down the walls of this factory occasionally even though the water may be very warm.

Roofs frequently are arranged so as to retain a pond of water. The evaporation of this water in warm weather cools the pond and the rooms below.

The olla, a porous drinking water jar hanging in the breeze and an institution in southern climes, cools the water to a refreshing degree below the air temperature by this same skin-evaporation.

A factory can be improved as to comfort and efficiency by observation of inexpensive precautions in construction. Artificial refrigeration in general is costly for installation, and carries a high interest and depreciation charge, due to its comparatively short period of use per year in this climate, and is expensive in operation. It should be undertaken only under competent advice from experienced engineers.

Telephones } Superior 0368
 } Superior 0369

ILLINOIS FIRE PROOF COVERING COMPANY

Contractors for

Heat, Cold and Frost
INSULATION

Pipe Covering

Boiler Covering

Stack Lining

Brine Insulation

Power Plant Insulation

Chicago Distributors for Novoid Cork Covering

ESTIMATES FURNISHED

216 West Kinzie Street
CHICAGO

SECTIONS OF THE SANITARY CODE OF INTEREST TO ARCHITECTS, WITH INDEX

Sections of the Building Ordinance pertaining to Sanitary and Health Departments are not included in these sections and may be found by referring to the Index to the Building Ordinance.

INDEX

Air Conditions Control, Division of

Assistants and employees.....	2125
Construction and reconstruction of plants—plans and specifications permit—commissioner of buildings to supervise	2126
Division of Air Conditions—Contract established in the department of health—duties	2123
Emission of dense smoke—regulations—abatement—penalty	2129
Head of division—qualifications—duties	2124

Heating Tenement Houses, Factories, Workshops

High-pressure boilers—repairs—permit required—penalty	2128
Method of determining temperature..	2120
Penalty	2122
Required temperature in factories—moisture content.....	2121
Required temperature complaints....	2119
Use of plant—certificate of commissioner of health required.....	2127

Bakeries and Bread

Bakery defined.....	295
Bakery discontinued for six months and re-opened—how considered....	312
Floor—how constructed.....	301
New Bakeries—requirements.....	311
Plumbing and drainage facilities—water closets and sinks.....	304
Sanitary requirements—ventilation..	300
Sleeping facilities—domestic animals, except cats, prohibited.....	305
Storage of materials and food.....	309
Walls and ceilings—woodwork.....	303

Drains, Sewers and Grades

Alteration of house drain.....	1096
Catch basins—removal of contents...	1092
Drain construction.....	1098
Excavation around sewer—permit....	1095
Inspection—right of entry.....	1099
Inspection of work.....	1086
Obstructing sewer—penalty.....	1094
Penalty	1088
Plans for buildings—not to be approved unless land is provided with adequate drains.....	1097
Renewal license.....	1087
Steam-discharge in sewer prohibited..	1093
Work on tile drains inside building line—outside building line—by whom approved and supervised....	1085

Homes

Accommodations for inmates—regulations as to sanitation.....	11897
Frontage consents required—when...	1881
Homes defined.....	1873

Hospitals

Application	1852
Accommodations for patients—regulations as to sanitation.....	1859

Frontage consents required—when...	1862
Hospital building.....	1853
Hospital building board.....	1858
Hospital defined.....	1850
Location of hospital near school or playground	1863
License required.....	1851

Laundries

Clear height between ceiling and floor ventilation—cubic feet of air space per person.....	2393
Floor—how constructed.....	2384
Lavatory facilities—separate room or space for wraps or outer clothing of employees.....	2387
Laundry defined.....	2375
Natural lights required—windows and skylights not to be obstructed.....	2380
Penalty	2379
Plumbing and drainage facilities—plumbing fixtures.....	2385
Sanitary conditions.....	2382
Sleeping in laundries—prohibited....	2381
Water closet accommodations.....	2386

Stores, Factories, Workshops—Miscellaneous Provisions

Ventilation of stores, factories, workshops, etc.....	2157
Seats for females.....	2160
Penalty	2161
Adequate water closets.....	2175
Roofs—drainage	2176
Drainage from premises where no sewer exists.....	2177
Cisterns	2178
Overflow from cistern.....	2179
Water closets, etc.—prevention of sewer gas	2180
Penalty	2181

Tenements and Lodging Houses

Conform to requirements.....	2134
Distances between buildings on same lot	2135
Height of ceiling's windows.....	2136
Lodging house defined.....	2146
Lodging house—ventilation.....	2137
Penalty	2147
Water supply—cellar floor—ventilation of halls.....	2138

Undertakers

Frontage consents.....	1902
Undertaker's place not be used as a public morgue.....	1921
Undertaking rooms.....	1903

Ventilation

Annual inspection fee.....	2155
Charges for approval of plans for mechanical ventilation equipment..	2154
Classes of buildings.....	2152
Penalty	2156
Ventilation in buildings.....	2153

C.W. Johnson, Inc.

211 No. Desplaines Street
CHICAGO

Monroe 6175

Maintaining a dignified sales policy.

Limiting sales to a volume which permits personal attention.

Transacting all business pleasantly.

Requiring all work to be done in a thorough and workmanlike manner.



*An agreement is a TRUST with us;
Not merely "just another job"*

***Heating and Ventilating
Contractors***

BAKERIES AND BREAD.

295.—Bakery defined.] Any establishment, place, wagon or stand used for the manufacture of bread, buns, rolls, biscuits, cakes, crackers, matzos, pretzels, pastry, doughnuts, waffles, noodles, macaroni, spaghetti or ice cream cones, or any establishment used for the process of mixing, compounding or baking of any food product of which flour or meal is a principal ingredient, for sale to the public, or for the purpose of a restaurant, bakery, hotel, commissary or catering establishment, shall be deemed a bakery for the purpose of this article; provided, that a licensed restaurant in which any of the foregoing food products are mixed and baked for consumption in such restaurant only, or in ordinary restaurant kitchen stoves or ranges, shall not be considered a bakery.

300. Sanitary requirements—ventilation.] Every place used as a bakery shall be kept in a clean and sanitary condition as to its floors, side walls, ceilings, woodwork, fixtures, furniture tools, machinery and utensils. All parts of the bakery shall be adequately lighted at all times and shall be ventilated by means of windows or skylights or air shafts or air ducts or mechanical apparatus, if necessary, so as to insure a free circulation of fresh air all times. Such ventilating construction and equipment shall be of such character that a complete change of air in all parts of the bakery may be made at least four times each hour; provided, however, that it shall not be necessary to ventilate at such time or in such manner that the process of mixing or rising of dough shall of necessity be interfered with or prevented.

301. Floor—how constructed.] The floor of every place used as a bakery, if below the street level, shall be constructed of concrete, cement, asphalt or other impervious material, or of tile laid in cement, which floor may, if desired, be covered with a hardwood floor having tight joints; if above the street level, the floor may be of hardwood with tight joints or may be of any impervious material, as above provided. The angles where the floor and wall join shall be made and maintained so as to be rat-proof.

303. Walls and ceilings—woodwork.] The side walls and ceilings shall be well and smoothly plastered, tiled or sheathed with metal or wood sheathing, and shall be kept in good repair. If made of mill construction with smooth surfaces, such walls and ceilings need not be sheathed or plastered. All walls and ceilings shall be kept well painted with oil paint, or lime washed and calcimined, and all woodwork shall be kept well painted with oil paint.

304. Plumbing and drainage facilities.—water closets and sinks.] Every such bakery shall be provided with adequate plumbing and drainage facilities, including well ventilated water closets and impermeable wash sinks on iron supports.

Amended January 2, 1924.

305. Sleeping facilities—domestic animals, except cats, prohibited.] No person shall sleep in any bakery, or in the rooms where flour or meal used in connection therewith, or the food products made therein, are handled or stored. If any sleeping places are located on the same floor as the bakery, they shall be well ventilated, dry and sanitary. No domestic animals, except cats, shall be permitted in a bakery or place where flour or meal is stored in connection therewith, and suitable provision shall be made to prevent nuisances from the presence of cats.

309. Storage of materials and food.] All rooms for the storage of flour or meal for use in connection with any bakery shall be dry and well ventilated, and every bakery and room used for the storage of materials and food products in connection therewith

shall be so arranged that the shelves, cupboards, trays, troughs, bins, cases and all other appliances for handling and storing same can be easily removed and cleaned. If the floor of any such bakery or room is below the adjacent street level, no such materials or products shall be stored nearer to such floor than one foot.

311. New bakeries—requirements.] No new bakery shall be hereafter established in any room, basement or cellar in which the clear height between the finished floor and ceiling is less than eight feet six inches or in any room or place, the floor of which is more than five feet below the street, sidewalk or alley level adjacent to the building, or in any room or place which is not so naturally lighted by means of windows, doors or skylights that on clear days a book or paper printed with long primer type can be read between the hours of ten o'clock a. m. and two o'clock p. m. in all parts of the bakery which are used in mixing or handling bakery products; provided, however, that where a bakery is to be installed for the purposes of a restaurant operated in connection with a railway passenger terminal, in case the plans for such bakery shall in all other respects comply with the ordinances of the City and such special requirements as the Commissioner of Health shall deem necessary with respect to its sanitary features and shall be approved by said commissioner, the said provisions shall not apply.

If any new bakery hereafter established has its floor above, at, or not more than three feet below the adjacent street or alley level, no window opening by which it is ventilated shall be less than three feet above such street or alley level; if the floor of any such bakery is more than three feet below the adjacent street or alley level, no such window opening shall be less than eighteen inches above such street or alley level.

Amended January 2, 1924.

312. Bakery discontinued for six months and reopened—how considered.] If any bakery which is now being maintained and operated shall be vacated, discontinued or unused for a period of more than six consecutive months and shall thereafter be reopened and re-established as a bakery, such bakery shall be considered a new bakery for purposes of this chapter.

DRAINS, SEWERS AND GRADES.

1085. Work on tile drains inside building line—outside building line—by whom approved and supervised.] All work done by licensed drain layers on drains or pipes inside any building or structure, and all work done on any catch basin or cesspool located on or in any private premises, shall be done according to plans approved by the commissioner of health, and under the supervision and to the satisfaction and approval of the commissioner of public works; and no such work shall be done except on a permit in writing issued by said commissioner of public works.

All work done by licensed drain layers on drains or pipes outside any building or structure or upon any street, alley, or public way, shall be done under the supervision and to the satisfaction and approval of the commissioner of public works; and no such work shall be done except on a permit in writing issued by said commissioner.

1086. Inspection of work.] All work done by licensed drain layers, other than work done on local improvements paid for wholly or in part by special assessment while such work is under the supervision and control of the board of local improvements, shall be subject to the inspection, supervision and approval of the commissioner of public works; and any faulty or defective work done by any licensed drain layer which may at

T. H. MONAGHAN
Pres.

E. H. MONAGHAN
Vice-Pres.

A. G. McDONALD
Sec'y. and Treas.

SUPERIOR 3421-2-3

ROBERT GORDON

Inc.

CONTRACTORS

Steam and Hot Water Heating

*Power Plants, Industrial Piping,
Ventilating*

*Mechanically Circulated
Hot Water Heating*

22-24 W. Austin Ave. Chicago, Illinois

A Few Installations

CHICAGO UNION STATION
CHICAGO UNION STATION POWER HOUSE
U. S. MAIL TERMINAL
CHICAGO DAILY NEWS
W. F. HALL PRINTING CO.
BUNTE BROS. CANDY FACTORY
SHERIDAN BROMPTON APARTMENTS
SHORELAND HOTEL
BUTLER BUILDING
100 WEST MONROE BLDG.
173 WEST MADISON ST. BLDG.
CHICAGO AND NORTHWESTERN GRAIN ELEVATOR
B. & O. R. R. GRAIN ELEVATOR
CHICAGO MEMORIAL HOSPITAL
MERCHANDISE MART

any time be discovered by him shall be made satisfactory to said commissioner.

Any licensed drain layer who shall neglect, refuse or fail to make good any defects or faults in his work which shall be discovered by said commissioner, shall not be permitted to do any further or additional work as a drain layer until the defects or faults so discovered have been made good in a manner satisfactory to the commissioner of public works; and any licensed drain layer who shall refuse, neglect or fail to make good such defects or faults, when requested so to do by said commissioner, or who shall otherwise violate or fail to comply with any of the provisions of this article or any rule or regulation of the department of public works governing or regulating the business of drain laying, shall have his license revoked by the mayor upon the recommendation of said commissioner, and shall not again be permitted to conduct, carry on, or engage in, the business of drain laying until satisfactory assurance shall be given to the mayor that such person will thereafter faithfully observe the ordinances of the city and the rules and regulations of the department of public works and until such drain layer shall have made good any loss, damage or expense caused by or on account of any negligence or misconduct on his part which was the cause of the revocation of his license.

1087. Renewal of license.] Any person licensed as a drain layer shall be entitled to have his license renewed without filing application, upon payment by him of the license fee of twenty-five dollars and the renewal of the bond hereinabove provided for.

1088. Penalty.] Any person, firm or corporation violating or failing to comply with any of the provisions of this article shall be fined not less than five dollars nor more than one hundred dollars for each offense.

ARTICLE II.

PUBLIC SEWERS AND DRAINS.

1092. Catch basins—removal of contents.] The contents of catch basins in public streets shall be removed by means of vehicles having boxes made of steel or iron, which boxes shall be not less than eighty cubic feet nor more than one hundred cubic feet in capacity.

ARTICLE III.

MISCELLANEOUS PROVISIONS.

1093. Steam—discharge in sewer prohibited.] No person shall make or use or cause to be made or used any connection with or opening into any sewer or drain for the conveyance or discharge into such sewer or drain of steam from any steam boiler or engine, or from any manufactory building in which steam is either generated or used, under a penalty of fifty dollars for each and every day during any part of which such connection or opening may have been used for that purpose.

1094. Obstructing sewer—penalty.] No grease, fatty matter, butcher's offal or garbage, dead animals, stone dust or other waste, causing obstructions, or wastes destructive of masonry or obstructions of any kind whatsoever shall be placed, thrown or deposited in any receiving basin, manhole, sewer or waterway; and any person, firm or corporation so offending or causing any such obstruction or substance to be so placed so as to be carried or delivered into such basin, manhole, sewer or waterway, shall be subject to a penalty of ten dollars for each offense; and any person, firm or corporation injuring, breaking, or removing any portion of any receiving basin, covering flag, manhole, vent or drain shall be subject to a penalty of twenty dollars for each offense; nor shall any quantity of marble or other

stone, iron, lead, timber or any other substance, exceeding one ton in weight, be placed or deposited upon any wharf or bulkhead through which any sewer or drain may run; nor upon or over any sewer or drain where the same shall be within three feet of the surface of the street, under a penalty of not more than fifty dollars for each offense, to be recovered of the person, firm or corporation causing or permitting the same.

1095. Excavation around sewer—permit.] Any person who shall uncover or excavate under or around any public sewer in this city, for any purpose whatever, without the written consent of the commissioner of public works, shall be fined not less than ten dollars and not more than fifty dollars for each offense.

1096. Alteration of house drain.] Any person who shall lay, alter or disturb any part of a house drain or drains, catch basin or strainer of such drain or drains, cesspool or water closet, connecting with any public sewer belonging to said city, without being duly licensed to perform the same by said commissioner, shall be fined not less than ten dollars and not more than fifty dollars for each offense.

1097. Plans for buildings—not to be approved unless land is provided with adequate drains.] No plans shall be approved and no permit shall hereafter be issued by the commissioner of buildings for the construction, enlargement, altering, repair or removal of any building on any tract, lot or parcel of land, unless such tract, lot or parcel of land shall be provided with adequate drains connecting with or emptying into a public drain or sewer in accordance with the general ordinances of the city or unless proceedings shall have been instituted to provide such drain or sewer.

1098. Drain construction.] It shall be the duty of any person constructing or using any private drain, sewer, cesspool, water closet pipe or other pipe connecting with or emptying into any public drain or sewer belonging to said city, to construct and use the same strictly in conformity with the orders and directions of the commissioner of public works and the commissioner of health, or either of them, and any person who shall construct or use, or cause to be constructed or used, any such drain, sewer, cesspool or water closet pipe in a different manner from that so ordered and directed by one or both of said commissioners, shall be fined not exceeding fifty dollars for each offense.

1099. Inspection—right of entry.] That the public drains and sewers of the city may be fully protected against improper use and injury, the commissioner of public works and his authorized agents shall have free and unobstructed access to any part of any premises where house drains, cesspools or water closets, connected with or draining into such drains or sewers, are laid, for the purpose of examining the construction, condition and usage of the same, and making necessary alterations or repairs, at any time of the day between the hours of seven o'clock a. m. and six o'clock p. m.; and any owner, occupant or other person, refusing to allow any officer or agent of said commissioner access to the premises for such purposes, shall be fined not less than five dollars nor exceeding fifty dollars for each offense.

HOSPITALS.

1850. Hospital defined.] For the purpose of this article a hospital is hereby defined to mean any institution or place used for the harboring or the reception, care and treatment (including treatments known as rest cure, physical culture, hydropathic massage and all other forms of drugless treatment) of two or more persons suffering from or afflicted with any mental or physical dis-

201 N. Wells St.
Chicago, Ill



Thielbar & Fugard
Architects

Trustees System Service Building

E. J. CLAFFEY CO.

HEATING—VENTILATION POWER PIPING

10-12-14 W. Illinois Street

Chicago, Ill.

Superior 7013-7014-7015

ease, bodily injury, alcohol or drug addiction; or any institution or place for the reception and care, temporary or continuous, of one or more women during pregnancy while awaiting confinement, during confinement, or for one month or less after confinement, while recovering therefrom; or any place or establishment advertised, announced, conducted or maintained under the name "hospital" without a qualifying statement that such hospital is not intended for human beings.

1851. License required.] It shall be unlawful for any person, firm, association or corporation other than the regularly constituted authorities of the United States, the state of Illinois, the county of Cook, or the city of Chicago to open, conduct, manage or maintain any hospital as defined in this article within the corporate limits of the city of Chicago without first obtaining a license therefor as hereinafter provided.

1852. Application.] Any person, firm, association or corporation desiring such license shall make written application to the commissioner of health which shall conform to the general provisions of this ordinance relating to applications for licenses, and which shall also state the location or proposed location of the hospital, the purpose for which it is to be opened, conducted or maintained, the accommodations or proposed accommodations for the inmates thereof, the nature and kind of treatment given or proposed to be given therein, the name and address of the chief physician, surgeon or attending chief physician or surgeon or board of physicians or surgeons attendant therein.

1853. Hospital building.] The building or buildings used or to be used as a hospital shall comply with the requirements of the department of buildings and bureau of fire prevention and public safety.

1858. Hospital building board.] For the purposes of this ordinance there is hereby created a hospital building board, which shall be composed of the commissioner of health, the commissioner of buildings and the chief of fire prevention and public safety. The hospital building board shall meet upon call of the commissioner of health and shall make such recommendations to the city council as it may deem necessary or expedient for the construction and erection of new hospital buildings and for changes in buildings now being used or which may hereafter be used for hospital purposes.

1859. Accommodations for patients—regulations as to sanitation.] In every hospital licensed under the provisions of this article each room occupied or to be occupied by a patient or patients, shall be of such dimensions as shall give each adult patient not less than eight hundred cubic feet of space, babies up to six months old, two hundred cubic feet, children from six months to six years, three hundred cubic feet, six years to fourteen years, six hundred cubic feet, with fresh air and floor space in proportion. Every such room shall have at least one window connecting with the external air for each two beds. Said windows shall be of such dimensions as shall secure to each patient at least twenty-four hundred cubic feet of fresh air per hour by natural ventilation, or in case said window shall not secure said twenty-four hundred cubic feet of air per hour by natural ventilation then each room shall, in addition thereto, be fitted with such appliances for ventilation as shall secure to each patient in said room at least twenty-four hundred cubic feet of fresh air per hour. Each bed shall have at least eighty square feet of floor space. In case the same is a maternity hospital, a regularly licensed physician must reside on the premises. Each ward or wing in said hospital shall have running water furnished in one or more places either in said ward or convenient thereto,

so that the same may be adequate and convenient to the occupants thereof. The plumbing, water closets, bath rooms and other sanitary appliances and equipment shall be constructed in accordance with the city ordinances relating thereto. The floor of the cellar or basement in any building used as a hospital shall be properly cemented so as to be water-tight. The halls of each floor shall be open to the external air, with suitable windows, and shall have no room or other obstruction at either end thereof, unless sufficient light or ventilation is otherwise provided for said hall, and the building as a whole shall be provided with adequate and proper fire escapes, stairways, or inclines for exits.

The doors, windows and other direct openings to the external air, of all hospitals, including the kitchen, dining rooms, laundry, toilet rooms, laboratory, morgue and post-mortem rooms of the same, shall be equipped from April 15th to November 15th with screens and appliances necessary for the exclusion of flies.

1862. Frontage consents required—when.] It shall be unlawful for any person, firm or corporation to build, construct, maintain, conduct or manage, in any block in which two-thirds of the buildings fronting on both sides of the street or streets on which the proposed hospital may face or extend, are devoted exclusively to residence purposes, any hospital, unless the owners of a majority of the frontage in such block, and the owners of a majority of the frontage on the opposite side or sides of the street or streets on which said building faces or extends, consent in writing to the building, constructing or maintaining, managing or conducting of any such hospital in such block. Such written consents of the majority of said property owners shall be filed with the commissioner of health before a permit shall be granted for building or constructing any such hospital and before a license shall be issued for the maintaining, conducting or managing of such hospital.

1863. Location of hospital near school or playground.] No hospital of any kind or description shall hereafter be erected or established within four hundred feet of any property used for a public or parochial school or as a public playground.

ARTICLE XI.

HOMES.

1873. Home defined.] For the purpose of this article a home is hereby defined to mean any institution, place or family used for the reception or care, for a longer period than twenty-four hours, of three or more infants or children apart from their parents. A home is further defined to mean any institution used for the reception or care of persons who are dependent or not capable of properly caring for themselves, and shall be understood to include homes for the aged or infirm, orphan asylums, half-orphan asylums, refuges and shelters, and also boarding homes caring for three or more women with their children when such children are less than fourteen years of age.

1879. Accommodations for inmates—regulations as to sanitation.] In every such home each room occupied or to be occupied by inmates shall be of such dimensions as shall give each inmate not less than four hundred cubic feet of air space. Every such room shall have at least one window connecting with the external air for each four beds. Said windows shall be of such dimensions as shall secure to each inmate at least one thousand five hundred cubic feet of fresh air per hour by natural ventilation, or in case said window shall not secure said one thousand five hundred cubic feet of fresh air per hour by natural ventilation,

W. F. THUMM, Inc.

1130 Cornelia Avenue

Lake View 8920

Heating and Refrigerating Contractors and Engineers



"THE INSTITUTION BACK OF THE INSTALLATION"



Our new home, erected to better serve the Building Industry, having switch track and large storage facilities for prompt and efficient service in all branches of Heating and Refrigeration. No operation too large, none too small. Our prices are consistent with the service rendered.



OUR ORGANIZATION IS AT YOUR SERVICE

then each room shall, in addition thereto, be fitted with such appliances for ventilation as shall secure to each inmate in said room at least one thousand five hundred cubic feet of fresh air per hour. Each bed shall have at least forty square feet of floor space, and in every room or dormitory containing more than one bed the beds shall be so arranged as to leave a passageway of not less than two feet horizontally on all sides of each bed.

Each ward or wing in said home shall have running water furnished in one or more places, either in said ward or convenient thereto so that the same may be adequate and convenient to occupants thereof. The plumbing, water-closets, bath-rooms and other sanitary appliances and equipment shall be constructed in accordance with the city ordinances relating thereto. The floor of the cellar or basement in any building used as a home shall be properly cemented so as to be water-tight.

The halls of each floor shall be open to the external air with suitable windows, and shall have no room or other obstruction at either end thereof, unless sufficient light or ventilation is otherwise provided for such halls, and the building as a whole shall be provided with adequate and proper fire escapes, stairways or inclines for exits.

All homes, including the culinary department, dining rooms, laundry, laboratory, morgue and post-mortem rooms connected with the same, shall be equipped from May 15th to November 15th with doors, screens and other appliances necessary for the exclusion of flies.

1881. Frontage consents required—when.] It shall be unlawful for any person, firm, association or corporation to build, construct, maintain, conduct or manage a home in any block in which two-thirds of the buildings fronting on both sides of the street or streets on or along which the proposed home may face are devoted exclusively to residence purposes, unless the owners of a majority of the frontage in such block and the owners of a majority of the frontage on the opposite side or sides of the street or streets on or along which said building faces, consent in writing to the building, construction or maintaining, managing or conducting of any such home in such block; provided, however, that no new frontage consents shall be required if such home has heretofore been licensed by the city of Chicago as a hospital, home or nursery at the present location. Such written consents of the majority of said property owners shall be filed with the commissioner of health before a permit shall be granted for the building or constructing of any such home, and before a license shall be issued for the maintaining, conducting or managing of any such home.

UNDERTAKERS—BURIALS.

1902. Frontage consents.] It shall be unlawful for any person, firm or corporation to establish or maintain a morgue or to carry on the business of an undertaker as defined in this article, that receives, in connection with such business, at his or its place of business, the body of any dead person for embalming or other purposes, on or along any boulevard or pleasure driveway, without consent of a majority of the property owners according to the frontage on both sides of such boulevard or pleasure driveway in the block in which such morgue or place of business is located; it shall also be unlawful for any person, firm or corporation to establish or maintain a morgue or to carry on the business of an undertaker, as defined in this article, that receives, in connection with such business, at his or its place of business the body of any dead person for embalming or other purposes, on or along any street in any block in which two-thirds of the buildings on both sides of

the street are used exclusively for residence purposes, without the written consent of a majority of the property owners according to the frontage on both sides of such street in such block; provided that nothing herein contained shall apply to such location in the case of any person licensed as an undertaker and authorized to carry on such business at any such location at the time of the passage of this ordinance, nor to any block in any street on which street cars are operated. Such frontage consents shall be obtained and filed with the department of health before a license shall issue for such business.

1903. Undertaking rooms.] No person shall be licensed to carry on the business of undertaking in any establishment, store or place, unless such establishment, store or place shall be provided with a compartment or room completely shut off or capable of being completely shut off from the other parts of such establishment, store or place; such compartment or room shall have free outside ventilation and light, and its floor shall be constructed of or covered with a non-absorbent material and shall be connected with a sewer by an approved sanitary drain.

1921. Undertaker's place not to be used as a public morgue.] No person licensed as an undertaker under the provisions of this article shall permit or allow any room, store, place or establishment conducted, used, operated or maintained by him in the undertaking business to be used as a public morgue. If any dead human body is brought to any such room, store, place or establishment, and if arrangements are not made for the burial or cremation of such body within one hundred hours from and after the hour of death, the body shall be taken by the undertaker to the Cook county morgue, or placed by him in one of the cemetery receiving vaults.

ARTICLE XXXI.

HEATING TENEMENT HOUSES, FACTORIES AND WORKSHOPS.

2119. Required temperature—complaints.] It shall be the duty of every person, firm or corporation owning or controlling the heating plant which furnishes heat to any tenement house, hotel, lodging house, rooming house or boarding house, as defined by the ordinances of the city, in which the heat is furnished from a heating plant used in common for the purpose of heating the various rooms and apartments therein, and such heating plant is under the control or supervision of such owner or person in control of such building, to furnish heat to such rooms and apartments from October 1st of each year to June 1st of the succeeding year, so that the occupants thereof may secure, without such undue restriction of ventilation as to interfere with proper sanitary conditions, a minimum temperature of 60 degrees Fahrenheit at 6:30 a. m., 65 degrees at 7:30 a. m., and 68 degrees at 8:30 a. m., and thereafter until 10:30 p. m., averaged throughout the apartment; provided, that written notice of complaint concerning lack of heat in such room or apartment shall first be given to such person, firm or corporation, owning or controlling such tenement house by registered mail before any person shall be deemed to have violated this section.

Amended January 2, 1924.

2120. Method of determining temperature. For the purpose of determining whether or not the temperature in any such room or apartment is in accordance with the provisions of the preceding section, temperature readings shall be made only by an inspector of the department of health by means of a standard Fahrenheit thermometer approved by the department of health in not less than two separate rooms in such apartment, or if

Telephone Superior 6671

KOHLBRY-HOWLETT CO.

CONTRACTING
ENGINEERS

Heating—Power Plants—Ventilation

63 West Ontario Street

CHICAGO

the apartment consists of only one room then in two opposite parts of the room as near the extremes as practicable, such thermometer to be placed at a point not less than four feet nor more than six feet away from any door or window leading to the outer air. Failure to furnish the heat required in the preceding section shall not constitute an offense where it is due to a breakdown of the heating plant, if diligence is used to have such plant repaired (unless such breakdown has been caused by the violation of an existing ordinance relating to the operation of heating plants), nor where it is due to strikes, to general shortage of fuel, to any act of the tenant who makes the complaint, or to any cause beyond the owner's control, unless written notice of such failure to furnish the heat hereby required shall first have been given to the owner or agent of the building by registered mail, and the temperature readings herein provided for shall not be made until after the delivery of such registered letter to the addressee thereof.

Amended January 2, 1924.

2121. Required temperature in factories—moisture content.] It shall be the duty of every person firm or corporation owning or controlling the heating plant which furnishes heat to any factory or workshop as defined by this ordinance, to maintain a temperature within such factory or workshop of not less than 68 degrees Fahrenheit without such undue restriction of ventilation as to interfere with proper sanitary conditions therein; provided, however, that this requirement shall not apply to any factory or workshop where the business conducted therein is of such a nature that a higher or lower temperature than 68 degrees Fahrenheit is necessary or expedient for the work, trade, occupation or manufacturing processes of the business so conducted therein; and provided further, that in all such cases, when such higher or lower temperature is necessary or expedient, the moisture content of the air shall be increased where the temperature is maintained below 68 degrees Fahrenheit or decreased where the temperature is maintained above 68 degrees Fahrenheit in the proper amount to maintain a wet bulb temperature between 54 degrees and 58 degrees Fahrenheit, and in the case of special manufacturing processes where it is necessary or expedient to maintain a wet bulb temperature below or above the extremes herein set forth, the commissioner of health shall prescribe and enforce such reasonable precautions and safeguards as will meet the requirements of such special manufacturing processes without endangering the health of the occupants of such factory or workshops. The manner of determining the temperature in all cases where the temperature to be maintained is 68 degrees Fahrenheit shall be the same as in section 2120, and in all other cases shall be in such practical manner as in the commissioner of health may determine.

2121a. Required Temperatures in Offices Stores, and Places of Employment.] It shall be the duty of any person, firm or corporation owning or controlling the heating plant which furnishes heat to any office, store or other place of employment, to maintain a temperature within such office, store or place of employment of not less than 68 degrees Fahrenheit without such undue restriction of ventilation as to interfere with proper sanitary conditions therein, between the hours of 8:00 A. M. and 6:00 P. M., from October first of each year to June first of the succeeding year, Sundays and full legal holidays excepted.

2122. Penalty.] Any person, firm or corporation owning or controlling a tenement house, hotel, lodging house, rooming house or boarding house, as defined by the ordinances of the city in which the heat is furnished as described in section 2119, owning or controlling the heating plant which

furnishes heat to any factory or workshop, office, store, or other place of employment as described in sections 2121 and 2121a, that violates any of the provisions of this article or neglects or refuses to comply therewith, after notice from the department of health as herein provided, shall, upon conviction thereof, be fined not less than twenty-five dollars nor more than two-hundred dollars for each offense, and a separate offense shall be deemed to have been committed each day that a violation of this article continues; provided, that no more than one fine shall be imposed for violations in the same building occurring on any one day.

ARTICLE XXXII.

DIVISION OF AIR CONDITIONS CONTROL.

2123. Division of air conditions control established in the department of health—duties.] There is hereby established a division of the department of health of the city of Chicago to be known and designated as the division of air conditions control. All employes in said division shall be appointed according to law and shall be under the supervision and control of the commissioner of health.

The division of air conditions control shall be charged with the inspection and control of the installation and maintenance of heating and ventilating equipment, the inspection of rooms for natural and mechanical ventilation, the prevention and abatement of smoke, gas and fume nuisances, the examination and approval of plans of all heating and ventilation installations, and of all smoke, gas and fume creating prevention and abatement installations installed or reconstructed in any building, location or on any premises within the city of Chicago.

2124. Head of division—qualifications—duties.] The head of the division of air conditions control shall be an engineer qualified by technical training in the theory and practice of heating, ventilation and air conditioning. He shall also be experienced in and thoroughly familiar with the design, construction and operation of steam boilers and furnaces and in the theory and practice of smoke prevention and abatement.

Under the direction of the commissioner of health, he shall have charge of the division of air conditions control, shall supervise and direct its operations and shall be charged with the enforcement of all laws of the state and ordinances of the city relative to the preservation of the purity of the air. He shall conduct, or cause to be conducted, investigations and studies of the condition of the air of the city and the measures necessary to preserve the same in the highest possible degree of purity.

2125. Assistants and employes.] There shall also be employed in the division of air conditions control, such engineers, inspectors, assistant inspectors, deputy inspectors and other employes as shall be provided for by the city council.

2126. Construction and reconstruction of plants—plans and specifications—permit—Commissioner of buildings to supervise.] No new plants nor any reconstruction of any existing plant for producing power and heat, or either of them, nor any new chimney connected with a steam plant, shall be erected or maintained in the city until plans and specifications of the same have been filed in the office of and approved by the commissioner of health and a permit issued by him for such erection, reconstruction or maintenance. Plans and specifications to be filed with the commissioner of health shall show the amount of work and the amount of heating to be done by such plant and all appurtenances thereto, including all provisions made for the purpose of securing complete combustion of the fuel to be used and for

H. P. Reger & Company

*HEATING PLUMBING
VENTILATING*

1501-7 East 72nd Place
Plaza 5700-1-2-3

159 North State Street
Franklin 1976-7

CHICAGO



the purpose of preventing smoke; said plans and specifications shall also contain a statement of the kind of fuel proposed to be used and shall also show that the room or apartment in which such plant shall be located is provided with doors, windows, air-shafts, fans and other means of ventilation sufficient to prevent the temperature of such room, apartment, basement or other portion of such building, wherein such steam plant or apparatus is to be used, from rising to a point higher than one hundred and twenty degrees Fahrenheit, and sufficient also to provide that the atmosphere of any such apartment, wherein such apparatus may be located, may be entirely changed every ten minutes. Upon the approval of such plans and specifications a duplicate set of which shall be left on file in said office, and upon the payment of the fees as hereinafter provided, the commissioner of health shall issue a permit for the reconstruction, erection or maintenance of such plant. As soon as the commissioner of health has examined the plans and specifications submitted, and has issued a permit as above provided, he shall notify the commissioner of buildings to see that the execution of the work permitted is carried out in conformity with the plans and specifications, with special reference to the amount of space used, the size and construction of the chimney or chimneys used, the provision for the prevention of smoke, and the provisions for ventilation, and for the proper temperature in the engine and boiler rooms.

2127. Use of plant—certificate of commissioner of health required.] It shall be unlawful for any person to use any new or reconstructed plant for the production and generation of heat and power, or either of them, until he shall have first procured a certificate from the commissioner of health certifying that the plant is so constructed that it will do the work required, and that it can be so managed that no dense smoke shall be emitted from the chimney connected with the furnace or firebox.

2128. High-pressure boilers—repairs—permit required—penalty.] No owner shall alter or repair any brick work on or about a high-pressure boiler without first submitting plans and specifications to the commissioner of health and securing a permit therefor and such work shall be done only by one properly licensed therefor. Any person who shall violate this section shall be liable to a fine of twenty-five dollars for each day upon which he shall prosecute such alteration, change or installation without a permit, and each day's violation shall constitute a separate offense.

2129. Emission of dense smoke—regulations—abatement—penalty.] The emission of dense smoke within the city from the smoke stack of any locomotive, steam boat, steam tug, steam roller, steam derrick, steam pile driver, tar kettle or other similar machine or contrivance, or from the smokestack or chimney of any building or premises, except for a period of six minutes in any one hour during which the fire box is being cleaned out or a new fire being built therein, is hereby declared to be a nuisance and may be summarily abated by the commissioner of health or by any one whom he may duly authorize for such purpose. Such abatement may be in addition to the fine hereinafter provided. Any person, firm or corporation owning, operating or in charge or control of any locomotive, steam boat, steam tug, steam roller, steam derrick, steam pile driver, tar kettle or other similar machine or contrivance, or

from the smokestack or chimney of any building or premises so owned, controlled or in charge of him or it, except for a period of six minutes in any one hour during which the fire box is being cleaned out or a new fire being built therein, shall be deemed guilty of a violation of this section, and upon conviction thereof shall be find not less than ten dollars nor more than one hundred dollars for each offense; and each emission of dense smoke in violation of the provisions of this section shall constitute a separate offense for each and every day on which such violation shall continue.

TENEMENT AND LODGING HOUSES.

2134. Conform to requirements.] No house or building hereafter erected shall be used as a tenement house or lodging house, and no house or building heretofore erected and not now used for such purposes shall be converted into, used or leased for a tenement or lodging house, unless, in addition to the requirements hereinbefore contained in article IX of chapter XVII of this ordinance, it conforms to requirements affecting tenement or lodging houses, or both, as specified in the following sections of this article.

2135. Distances between buildings on same lot.] It shall not be lawful hereafter to erect for or convert to the purpose of a lodging house any building on any lot, other than a corner lot, where there is another building on the same lot, unless there is a clear, open space exclusively belonging thereto, and extending upward from the ground, of at least ten feet between such buildings, if they are one story high above the level of the ground; if they are two stories high, the distance between them shall not be less than fifteen feet; if they are three stories high, the distance between them shall not be less than twenty feet; and if they are more than three stories high, the distance between them shall be not less than twenty-five feet.

2136. Height of ceilings—windows.] In every such house hereafter erected or converted, every habitable room except rooms in the attic shall be in every part not less than eight feet in height from the floor to the ceiling; and every habitable room in the attic of any such building shall be at least eight feet in height from the floor to the ceiling throughout not less than one-half the area of such room. Every such room shall have at least one window connecting with the external air, or over the door an adequate ventilator connecting it with a room or hall which has a connection with the external air, and so arranged as to produce a cross current of air. The total area of window or windows in every room communicating with the external air shall be at least one-tenth of the superficial area of every such room; and the top of one at least of such windows shall not be less than seven feet and six inches above the floor, and the upper half at least shall be made so as to open the full width. Every habitable room of a less area than one hundred superficial feet, if it does not communicate directly with the air, and is without an open fireplace, shall be provided with a special means of ventilation by a separate air shaft extending to the roof, or otherwise, as the commissioner of buildings may prescribe.

2137. Lodging house—ventilation.] Every house, building, or portion thereof in the city, designed to be used, occupied, leased or rented, or which is used, occupied, leased or rented, for a lodging house, shall have in every room which is occupied as a sleeping room and which does not communicate directly with the external air a ventilating or transom window having an opening or area of three square feet over the door leading

CHARLES E. EVANS & CO.

HEATING AND VENTILATING CONTRACTORS

7 and 9 North May Street
Chicago, Illinois

Telephones: MONROE 7289 and 7290



We have just completed 628 Apartments, Power Plant
and 100 car Garage for the Marshall Field Estate

WORK NOW IN PROGRESS:

Administration Bldg. Montgomery Ward & Co.
Lake Street Plant, A. B. Dick Company
New Addition, Chicago Mail Order House

into and connected with the adjoining room, if such adjoining room communicates with the external air, and also a ventilating or transom window of the same opening or area communicating with the entry or hall of the house; or where this is from the relative situation of the rooms impracticable, such last mentioned ventilating or transom window shall communicate with an adjoining room that itself communicates with the entry or hall. Every such house or building shall have in the roof at the top of the hall an adequate and proper ventilator. No room in any lodging house shall be so occupied that the allowance of air to each person living or sleeping in such room shall at any time be less than four hundred cubic feet for each such person more than twelve years old and two hundred cubic feet for each such person of the age of twelve years or under.

2133. Water supply—cellar floor—ventilation of halls.] Every such house hereafter erected or converted shall have proper conveniences and receptacles for ashes and rubbish; it shall have water furnished at one or more places in such house or in the yard thereof, so that the same may be adequate and reasonably convenient for the use of the occupants thereof; it shall have the floor of the cellar properly cemented so as to be water-tight; the halls of each floor shall open directly to the external air, with suitable windows, and shall have no room or other obstruction at the end, unless sufficient light or ventilation is otherwise provided for said hall in a manner approved by the commissioner of buildings.

2146. Lodging house defined.] A lodging house shall be taken to mean and include any house or building or portion thereof in which persons are harbored or received or lodged for hire for a single night or for less than a week at one time, or any part of which is let for any person to sleep in for any term less than a week.

2147. Penalty.] Any person who shall violate, disobey, neglect, or refuse to comply with, or resist, any of the provisions of this article, or who refuses to comply with any of the sanitary regulations of the department of health concerning any of the matters or things mentioned in this article shall be fined not less than ten dollars nor more than two hundred dollars for each offense.

VENTILATION.

2152. Classes of buildings.] Whenever reference is made in this article to any class of buildings it shall be understood as meaning the kind of building designated in the same way in chapter XVII of this ordinance.

2153. Ventilation in buildings.] (a) The air in any room used as an auditorium in buildings of classes IVb, IVc, IVd and V hereafter erected, and the air in any room used as a class room or assembly hall in buildings of class VIII hereafter erected, shall be changed so as to provide each person for whom seating accommodation is provided in such auditorium, class room or assembly hall with at least fifteen hundred cubic feet of air per hour.

(b) In buildings of class VII hereafter erected, on floors frequented by the public, the air in such rooms shall be supplied at the following rates:

For each person in basement, two thousand cubic feet per hour.

For each person in first to third stories, both inclusive, fifteen hundred cubic feet per hour.

For each person in fourth story and above, except as hereinafter provided, thirteen hundred cubic feet per hour.

(c) For the purpose of determining the number of people on any floor in buildings of class VII, in calculating the means of ventilation, the following floor area per person per floor shall be taken as the basis.

Basement, per person, twenty square feet of floor area, exclusive of walls, stairs and elevators.

First story, per person, fifty square feet of floor area, exclusive of walls, stairs, elevators and inclosed show windows.

Second story, per person, fifty square feet of floor area, exclusive of walls, stairs, elevators and inclosed show windows.

Third story, per person, sixty square feet of floor area, exclusive of walls, stairs and elevators.

Fourth story and above, per person, eighty square feet of floor area, exclusive of walls, stairs and elevators, except as hereinafter provided.

(d) Grocery departments and restaurants, per person, forty square feet of floor area, exclusive of walls, stairs and elevators.

(e) The amount of carbon dioxide in the air of any such auditorium, class room or assembly hall or space frequented by the public, in class VII buildings, shall not be permitted to rise above ten parts of carbon dioxide per ten thousand parts of air, measurements being taken at levels from two and one-half to eight feet above the floor, generally distributed, and the temperature in such spaces, when artificially heated, shall not exceed sixty-eight degrees Fahrenheit. Relative humidity shall not be less than forty-five degrees nor more than eighty degrees.

(f) The air in any room used as an auditorium in buildings of classes IV and V constructed prior to March 13, 1911, and the air in any room used as a class room or assembly hall in buildings of class VIII constructed prior to said date, shall be changed, so as to provide each person for whom seating accommodation is provided in such auditorium, class room or assembly hall with at least twelve hundred cubic feet of air per hour.

(g) The air in any rooms and floors in buildings of class VII erected prior to March 13, 1911, shall be supplied, by mechanical or other means, at the following rates:

For each person in basement, sixteen hundred cubic feet per hour.

For each person in first to third stories, both inclusive, twelve hundred cubic feet per hour.

For each person in fourth story and above, except as hereinafter provided, ten hundred and forty cubic feet per hour.

For each person in grocery departments and restaurants, twelve hundred cubic feet per hour.

(h) For the purpose of determining the number of people on any floor in buildings of class VII, in calculating the means of ventilation, the following floor area per person per floor shall be taken as the basis:

Basement, per person, twenty square feet of floor area, exclusive of walls, stairs and elevators.

First story, per person, twenty square feet of floor area, exclusive of walls, stairs, elevators and inclosed show windows.

Second story, per person, fifty square feet of floor area, exclusive of walls, stairs, elevators, and inclosed show windows.

Third story, per person, sixty square feet of floor area, exclusive of walls, stairs and elevators.

Fourth story and above, per person, eighty square feet of floor area exclusive of walls, stairs and elevators, except as hereinafter provided.

THE ENSIGN CO.

ENGINEERING
CONTRACTORS

HEATING - VENTILATING - POWER

35 E. WACKER DRIVE CENTRAL 1436

CHICAGO

REPRESENTATIVE INSTALLATIONS

Pure Oil Building

FORTY ONE FLOORS

WACKER DRIVE and WABASH AVE.

F. P. DINKELBERG — ARCHITECT

The Bankers Building

FORTY ONE FLOORS

CLARK and ADAMS STS.

D. H. BURNHAM & CO. — ARCHITECTS

The Woolworth Building

TEN STORIES

STATE AND WASHINGTON STREETS

W. W. AHLSCHLAGER — ARCHITECT

The City State Bank Bldg.

TWENTY THREE FLOORS

RANDOLPH and WELLS STS.

D. H. BURNHAM & CO. — ARCHITECTS

The Millinery Building

TWENTY FOUR FLOORS

S. WATER and GARLAND COURT

RISSMAN & HIRSCHFELD — ARCHITECTS

Grocery departments and restaurants, per person, forty square feet of floor area, exclusive of walls, stairs and elevators.

(i) The amount of carbon dioxide in the air of any such auditorium, class room or assembly hall or space frequented by the public in class VII buildings shall not be permitted to rise above twelve parts of carbon dioxide per ten thousand parts of air, measurements being taken at levels from two and one-half feet to eight feet above the floor, generally distributed; and the temperature in such places, when artificially heated, shall not exceed seventy degrees Fahrenheit. The relative humidity shall not be less than forty degrees nor more than eighty-five degrees.

(j) The word "auditorium," as used in this section in connection with buildings of classes IV and V, shall be construed as including the main floor, balcony and galleries.

(k) In buildings hereafter erected for, or converted to, the use of a factory, mill or workshop, the air shall be changed, except as hereinafter provided, so as to provide each person for whom working accommodations are provided therein with at least fifteen hundred cubic feet of air per hour.

(l) In buildings used for the purpose of a factory, mill or workshop at the time of the passage of this ordinance, the air shall be changed, except as hereinafter provided, so as to provide each person for whom working accommodations are provided therein with at least twelve hundred cubic feet of air per hour.

(m) In any building or room hereafter erected for, or converted to the use of, a factory, mill or workshop, the amount of carbon dioxide in the air, except as hereinafter provided, shall not be permitted to rise above ten parts of carbon dioxide per ten thousand parts of air.

(n) In buildings or rooms used for the purpose of a factory, mill or workshop at the time of the passage of this ordinance, the amount of carbon dioxide in the air, except as hereinafter provided, shall not be permitted to rise above twelve parts of carbon dioxide per ten thousand parts of air. The measurements in each case above enumerated in this paragraph shall be taken at levels from two and one-half feet to eight feet above the floor, distributed generally; and the temperature in such spaces, when artificially heated, shall not exceed sixty-eight degrees Fahrenheit, except as hereinafter provided; the relative humidity shall not be less than forty degrees nor more than eighty-five degrees.

(o) The above provisions and standards as to ventilation shall not apply to storage rooms or vaults or any place where the manufacturing processes therein conducted would be materially interfered with, or where manufacturing processes therein conducted would produce considerable quantities of free carbon dioxide, except that the air in such rooms or vaults or in any places of manufacture shall not be permitted to become detrimental to the health of those who enter or work therein.

(p) No part of the fresh air supplied in compliance with the requirements of this section shall be taken from any cellar or basement.

(q) No person, firm or corporation, either as owner, proprietor, lessee, manager or superintendent of any factory, mill, workshop or any other building where one or more persons are employed, shall cause, permit or allow the same or any portion or apartment of any room in such factory, mill or workshop, to be overcrowded or to have inadequate, faulty or insufficient light or ventilation.

(r) No person shall be exposed to any direct draft from any air inlet, nor to any draft having a temperature of less than sixty degrees.

(s) All poisonous or noxious fumes or gases arising from any process, and all dust of a character injurious to the health of persons employed, which is created in the course of a manufacturing process, within such factory, mill, workshop or laundry, shall be removed, as far as practicable, by either ventilating or exhaust devices.

2154. Charges for approval of plans for mechanical ventilation equipment.] The commissioner of health shall make the following charges for the approval of plans for mechanical ventilation equipment and for the inspection and testing of the same.

Five dollars for an equipment handling five thousand cubic feet of air per minute, or less, and one dollar for each additional capacity of one thousand cubic feet per minute.

The owner or contractor shall be granted a certificate of inspection when the final inspection and test is made and the fee paid.

No fee for minor alterations shall be charged unless the alterations include changes in the method of ventilating or in the total capacity of the equipment, in which case the charge will be one dollar for every one thousand cubic feet of air per minute additional capacity.

2155. Annual inspection fee.] An annual inspection of all mechanical ventilation equipment in public and semi-public buildings and places of employment shall be made by the commissioner of health to see that the same is in proper operating condition. The fee for the annual inspection shall be fifty cents per one thousand cubic feet or fraction thereof, of air handled per minute. Such annual inspection fee shall be paid in advance to the city collector on the first day of March of each year.

2156. Penalty.] Any person, firm or corporation violating or failing to comply with any of the provisions of this article shall be fined not less than five dollars nor more than two hundred dollars for each offense, and every day on which such violation shall continue shall be deemed a distinct and separate offense.

STORES, FACTORIES, WORKSHOPS— MISCELLANEOUS PROVISIONS.

2157. Ventilation of stores, factories, workshops, etc.] No person, firm or corporation, being the owner, proprietor, lessee, manager or superintendent of any store, factory, workshop or other structure or place of employment where workmen and workwomen are employed for wages, shall cause, permit or allow the same or any portion or apartment of, or any room in such store, factory, workshop or other structure or place of employment, to be overcrowded or inadequate, faulty or insufficient in respect of light, ventilation, heat and cleanliness; and in every such building or apartment, or room in any such building, where one or more persons are employed as aforesaid, at least five hundred cubic feet of air space shall be allowed to each and every person employed therein, and fresh air supplied by ventilation at the rate of four complete changes of air per hour during the hours of employment. No part of such air supply shall be taken from any cellar or basement.

2160. Seats for females.] It shall be the duty of all employers of females in any mercantile or manufacturing business or occupation to provide and maintain seats for the use of such female employees, and to permit, to a reasonable extent, the use of

THE HAINES COMPANY

VENTILATING AND AIR CONDITIONING CONTRACTORS

1929-1937 WEST LAKE STREET
CHICAGO



Carson Pirie Scott & Co., Wholesale
Carson Pirie Scott & Co., Retail
Chicago Mercantile Building
Finchley Building
Sears, Roebuck & Co., 62nd & Western
Chicago Post Office Garage
Medical Group, University of Chicago
Wieboldt Hall, University of Chicago
Bobs Roberts Hospital, University of Chicago
Chicago Latin School
Hartman Building
Jewelers Building
Morton Building
The Fair Store
The Allerton Building
Roanoke Tower
Furniture Mart Addition
Chicago Daily News Building
Chicago Mail Order Co. Building
Goldblatt Bros. Department Stores
Adler Planetarium

such seats by such employes during the hours of their employment, for the preservation of their health. Seats shall be furnished at the ratio of one seat for every four female employes. All mercantile and manufacturing occupations and establishments where females are employed shall be inspected by officers of the health department to ascertain if this section is complied with, and any employer violating any of the provisions of this section shall be subject to a fine of not less than five dollars nor more than one hundred dollars.

2161. Penalty.] Any person violating, disobeying, neglecting or refusing to comply with any of the provisions of this article, where no other penalty has been provided, shall be fined not less than ten nor more than one hundred dollars for each offense.

2175. Adequate water closets.] Every person who shall be the owner, lessee or keeper or manager of any tenement house, boarding house, lodging or manufactory, shall provide or cause to be provided for the accommodation thereof and for the use of the tenants, lodgers, boarders and workers therein, adequate privies, urinals and water closets, and the same shall be so ventilated, and shall at all times be kept in such cleanly and wholesome condition as not to be offensive to the persons within the building or to the public or be dangerous or detrimental to health.

2176. Roofs—drainage.] The roof of every house shall be kept in good repair and so as not to leak, and all rain water shall be so drained or conveyed therefrom as to prevent its dripping on the ground, or causing dampness in the walls, yard or area.

2177. Drainage from premises where no sewer exists.] Where no sewer exists in the street, the yard or area of all premises shall be so graded that all water from the roof or otherwise, and all filth, shall flow freely from such premises and all parts of same into the street gutter, by a passage beneath the sidewalk, but so arranged as to be by a permanent cover, but so arranged as to permit access to remove obstructions or impurities. No such passage or drain or any appurtenance thereof, shall be permitted to become filthy or offensive, or to create a nuisance.

2178. Cisterns.] No cistern for the collection and storage of rain water from roofs shall be constructed or placed within any building that is used for human habitation or occupancy.

2179. Overflow from cistern.] No cistern used for the collection and storage of rain water from roofs shall have its overflow pipe directly connected with any sewer or drain.

If any overflow pipe is provided for any such cistern, such pipe shall lead to an area or gutter and shall have its outlet protected with a suitable metal screen.

2180. Water closets, etc.—prevention of sewer gas.] No water closet, sink, tub, vat or other structure shall hereafter be constructed within the city having connection with or by any sewer or underground passage, unless the same is provided with adequate or the best generally approved constructions and precautions for preventing gases and other offensive currents, substances and smells from passing up or out through such connection from such sewer or passage; nor shall any such water closet or privy be constructed without adequate provisions for the effectual and proper ventilation and cleansing thereof.

2181. Penalty.] Any person, firm or corporation that violates or fails or refuses to

comply with any of the provisions of this article, or resists any officer in the discharge of his duty concerning any of the matters in this article contained, where no other penalty is specifically provided, shall be fined not less than ten dollars and not more than two hundred dollars for each offense.

LAUNDRIES.

2375. Laundry defined.] Any place, building, structure, room, establishment, or portion thereof, which is used for the purpose of washing, drying, starching, or ironing shirts, dresses, underwear, collars, cuffs or other wearing apparel, table, bed or other household linens, towels, curtains, draperies or other washable fabrics, such work being done for the general public, shall be deemed a laundry and subject to the provisions of this chapter.

The word "laundry," as used in this chapter, shall also be held to include any private laundry maintained or operated in connection with any hotel, restaurant or public institution, except a hospital or charitable institution where no charge is made for laundry services.

The provisions of this chapter shall not apply to any female engaged in doing custom laundry work at her home for a regular family trade, nor to any room, rooms or portion thereof, located in a tenement house or other dwelling, in which domestic laundry work is done by or for the occupants of such building exclusively.

2379. Penalty.] Any person, firm or corporation that shall hereafter establish, maintain, conduct, carry on or operate a laundry without first procuring a license so to do, shall be fined not less than twenty-five dollars nor more than two hundred dollars for each offense, and each day or fraction of a day on which such person, firm or corporation shall maintain any laundry without a license shall be construed as a separate and distinct offense.

SANITARY REQUIREMENTS.

2380. Natural lights required—windows and skylights not to be obstructed.] No laundry shall be established, maintained, conducted or operated in any cellar, basement, or in any other room or place in any building which is not provided with sufficient natural light, by means of windows or skylights, so that on clear days, during the period between one hour after sunrise and two hours before sunset on sunny days, illuminometer tests shall show a minimum illumination of five foot candles in all parts of such room or place, not directly obstructed by machinery or other equipment. The general arrangement of all machinery and equipment in such laundry shall be such as not to unnecessarily obstruct the lighting and ventilating through such windows and skylights.

2381. Sleeping in laundries prohibited.] No person shall be permitted to sleep in any laundry, nor shall any sleeping room or living room be in direct communication with any laundry. No laundered or unlaundered fabric belonging to the trade of any laundry shall be stored or kept in any room which is used for living purposes.

2382. Sanitary conditions.] Every room or place used as a laundry, or for the storage of unlaundered or laundered fabrics in connection therewith, shall, at all times, be kept in good repair and maintained in a clean and sanitary condition as to floors, walls, ceilings, windows, woodwork, machinery, utensils and fixtures, and every such room or place shall be kept free from rats, mice and vermin, and all matters of an infectious or contagious nature.

GILLESPIE-DWYER Co.

**VENTILATING and
AIR CONDITIONING
• • CONTRACTORS • •**



GENERAL SHEET METAL WORK

2237-45 West Lake Street

TELEPHONES WEST { 1840
1841
1842

CHICAGO, ILL.

No person who has tuberculosis, any acute or active venereal disease, any communicable or loathsome skin disease, or any other communicable disease, shall work in any laundry, and no owner, proprietor, manager or person in charge of any laundry shall knowingly require, permit or suffer any such person to be employed therein.

No wall paper shall be applied upon the walls or ceilings of any room used for laundry purposes.

2383. Clear height between ceiling and floor—ventilation—cubic feet of air space per person.] No laundry shall be established, maintained, conducted, or operated in any room or place in which the clear height between the ceiling and the finished floor is less than ten feet, or which is not ventilated by means of windows, skylight, air shafts, air ducts, or mechanical apparatus so that a complete change of air in all parts of such room or place may be made at least four times each hour; and in every such room or place at least one thousand cubic feet of air space shall be provided for each and every person employed therein; provided that any laundry now in existence may be maintained and operated at its present location in any room or place in which the clear height between the ceiling and the finished floor does not fall below eight feet, six inches.

Every room in any laundry (except the room or rooms used for drying purposes) in which the temperature and humidity are such as in the judgment of the commissioner of health might endanger the health of the persons employed therein shall be provided with a mechanical ventilating system approved by the commissioner of health.

2384. Floor—how constructed.] The floor of every laundry and every room or place in connection therewith, except the room or rooms in which wearing apparel, household linens, bedding, towels, or other fabrics are washed, shall be constructed of hardwood or any impervious material. The floor of the room or rooms in which wearing apparel, household linens, bedding, towels, or other fabrics are washed shall be constructed of hardwood with tight joints, concrete, cement, tile or stone laid in cement, or other impervious material, and shall be water-tight and properly drained to the public sewer. The angles where the floor and wall

join shall likewise be water-tight. Provided, that in laundries hereafter established, the floor of the wash room shall be of concrete, cement, tile, or stone laid in cement, or other impervious material, and shall be water-tight and properly drained to the public sewer.

2385. Plumbing and drainage facilities—plumbing fixtures.] Every laundry shall be provided with adequate sanitary plumbing and drainage facilities, and the installation of all drains and plumbing fixtures shall be in accordance with the requirements of the ordinance of the city at the time they are installed. Every water closet, sink, or other plumbing fixture, installed therein shall be of an approved type, impermeable and thoroughly sanitary.

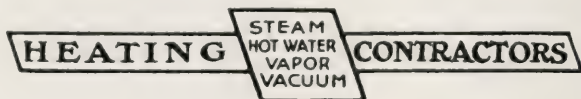
2386. Water closet accommodations.] Every laundry shall be provided with separate water closet facilities for male and female employees, and every room or compartment in which any water closet is installed shall be provided with adequate natural ventilation by means of windows or skylights opening to the external air.

2387. Lavatory facilities—separate room or space for wraps or outer clothing of employees.] Every laundry shall be provided with sufficient and suitable lavatory facilities, including approved wash bowls, wash basins, or sinks, supplied with hot and cold running water, soap, clean individual towels, and such other equipment as the commissioner of health may deem necessary for the health and comfort of the persons employed therein.

A separate room, or sufficient space in a room, which is entirely separate from the room or rooms in which wearing apparel linen or other fabrics are washed or dried, and which can be maintained in a dry and sanitary condition, shall be provided and maintained in every laundry as a cloak or locker room in which employees may keep their wraps or outer clothing, and if the management of any laundry shall require the persons employed therein to wear any special or designated garment during the hours of employment, such space or room shall be so arranged that employees may make such changes as may be necessary with a reasonable degree of privacy.

Telephones { MONROE 6480
 { MONROE 6481

J. P. BALDWIN CO.



1304 W. Washington Blvd.
Chicago



Refrigerating Process Piping
Vacuum Cleaning Systems

Telephone Franklin 0855

A. KILANDER & CO.

CONTRACTORS

Steam and Hot Water Heating

Power Plant Piping

General Steam Fitting

126 South Clinton Street
CHICAGO

PHILLIPS, GETSCHOW CO.

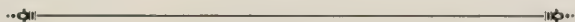
Engineers & Contractors

HEATING, VENTILATING
POWER, INDUSTRIAL PIPING, REFRIGERATION

421 North State Street

Telephone Superior 6116

CHICAGO



Partial List of Installations

Field Museum of Natural History
Palmer House
Stevens Hotel
United Masonic Temple
Twin Wrigley Buildings
Elks National Memorial Building
Medical and Dental Arts Club

Medinah Temple
State-Lake Building
Kesner Building
The Fair Store
Consumers Building
State Bank of Chicago

Telephone, Irving 4310-4311

Glennon-Bielke Co.

Steam
Vacuum

HEATING

Water
Vapor

Power Plants, Ventilation

3045 Irving Park Boulevard

CHICAGO, ILLINOIS

Experience over 50 years

Mehring & Hanson Co.

Heating, Cooling and Ventilating Systems

POWER PLANTS POWER PIPING

General Steam Fitting

162-166 N. Clinton Street

CHICAGO, ILLINOIS

Telephone Franklin 7760

NOTABLE CHICAGO INSTALLATIONS

Board of Trade Bldg.	Hibbard, Spencer, Bartlett Co.	5000 East End Ave. Apartments
Continental-Illinois Bank & Trust Bldg.	Tribune Tower	Powhatan Apartments
Insurance Exchange South Bldg.	Michigan Square Bldg.	Chicago Beach Hotel
No. One North La Salle Bldg.	700 N. Michigan Bldg.	Hotel Windermere East
Builders Bldg.	Chapin Bldg.	Uptown Theatre
London Guarantee & Accident Bldg.	American Bankers Insurance Bldg.	Tivoli Theatre
Michigan-Lake Bldg.	Drake Hotel	Union League Club
Bell Building	Sheridan-Grace Apartments	University of Chicago
333 N. Michigan Ave. Bldg.	1325 Astor Street Apartments	Tunnel—Welded Piping
	2434 Lake View Ave. Apartments	Shedd Aquarium
		Soldiers' Field Stadium



Patrician Apartments and Annex Chicago, Illinois
Established 1895

NILSON BROS., *Plumbing and Heating*

3222-24 N. Halsted Street, Chicago

Telephone Wellington 2500

INSTALLATION

REMODELING

Telephones Monroe 4000

WILLIAM A. POPE

HEATING AND POWER PLANTS
POWER PLANT PIPING

26 N. Jefferson Street

CHICAGO



Randolph 7424

Randolph 7425

Oak Park Office
7234 Circle Avenue, Forest Park

William Lees, Inc.

Contractors for Steam and Hot Water
Heating Apparatus, Ventilating and
Steam Power Plants

548 West Washington Boulevard

CHICAGO

Heating & Ventilating
Contractors on
Chicago Temple
Holabird & Roche,
Architects

TELEPHONE MONROE 0577



W. W. WATSON

CONTRACTOR FOR

Plumbing, Gas Fitting and Drainage



708 N. CARPENTER STREET, CHICAGO

At Milwaukee Avenue

AMERICAN AUTOMATIC FIRE PROTECTION CO.



ENGINEERS
CONTRACTORS
MANUFACTURERS

AUTOMATIC SPRINKLER
SYSTEMS
POWER PIPING

NINE SOUTH CLINTON STREET
CHICAGO

TELEPHONE DEARBORN 2992-2993

PHONE BUCKINGHAM
2701
2702
2703
2704



NOBLE & THUMM Co.

PLUMBING

1065 ADDISON STREET
OPPOSITE CUBS PARK

CHICAGO

The JOHNSON DUAL SYSTEM of Automatic Temperature Control

Each thermostat is capable of maintaining either of two temperatures; one a suitable occupancy temperature, the other a reduced temperature for those hours when parts of building are not in use. The instruments may be connected in groups depending upon varied usage of different sections of the building.



JOHNSON DUAL
THERMOSTAT

Economy • Comfort • Convenience

JOHNSON SERVICE COMPANY

Automatic Temperature Regulation Since 1885

MAIN OFFICE & FACTORY
MILWAUKEE, WIS.

BRANCH OFFICES
IN ALL PRINCIPAL CITIES

Telephone Franklin 3720

WESTERN VENTILATING and ENGINEERING CO.

*Supply and Exhaust
Ventilating Systems*

Shavings and Dust Collecting Systems

24-26 SOUTH CLINTON STREET

CHICAGO, ILL.

PHONE, LINCOLN 0547-48

Monarch Ventilating Co.

(Incorporated)

Sheet Metal Contractors

Our Specialty Ventilating Systems for

THEATRES, HOTELS, RESTAURANTS, FACTORIES, ETC.

Boiler Breechings, Ventilating Stacks

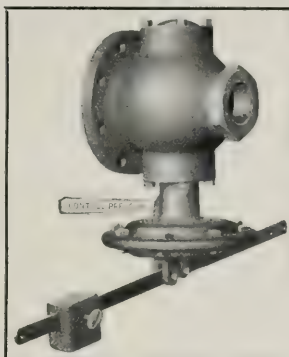
Sheet Metal Work in General

1523 Kingsbury Street

CHICAGO, ILLINOIS

DAVIS AUTOMATIC Pressure Control Equipment

Pressure Regulators
Balanced Valve
Float Valve
Fluid Control Valve
Stop and Check Valves
Solenoid Valve
Strainer
Cushioned Check Valves



Davis Pressure Regulator

Back Pressure Valve
Exhaust Relief Valves
Steam Trap
Emergency Stop Valve
Flow Regulator
Non-Return Valves
Bleeder Valve
Float Box with Valve

An important item in many engineering specifications for more than 50 years

G. M. DAVIS REGULATOR COMPANY
422 Milwaukee Avenue, Chicago
TELEPHONE MONROE 3460

“CHICAGO” Pumps

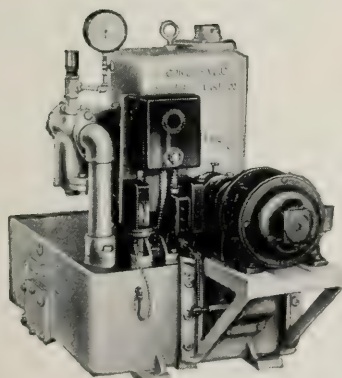


Fig. 1990
“Condo-Vac” Vacuum Pump

“Flush-Kleen” Sewage Ejector cannot be clogged by Rags, Sticks or Paper—Sewage never touches the impeller. See it in operation at the Builders Building exhibition.



“Condo-Vac” Return Line Condensation Pump and Receiver is quiet, efficient, compact. Inlet only 10 inches off floor. It has a centrifugal air pump. Made in sizes up to 100,000 sq. ft. direct radiation—single or duplex.

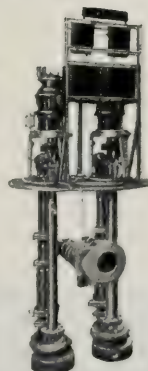
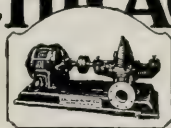


Fig. 2041
“Flush-Kleen”
Sewage Ejector

CHICAGO PUMP COMPANY

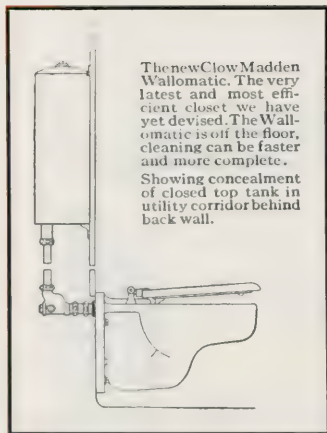


SEWAGE-CONDENSATION-CIRCULATING
BILGE-FIRE-HOUSE-VACUUM

2304 Wolfram St.

Phone Brunswick 4110

Chicago, Ill.



The new Clow Madden Wallomatic. The very latest and most efficient closet we have yet devised. The Wallomatic is off the floor, cleaning can be faster and more complete.

Showing concealment of closed top tank in utility corridor behind back wall.

NEVER FAILED... *because someone forgot...*

Clow Madden Automatic Closets never have and *never will* . . . fail to flush because someone forgot.

Automatically . . . immediately . . . a cleansing flood cleans the bowl, from top through trap.

Clow Madden Automatics "carry on" for the life of the building. Records prove them still "young" after 25 years' steady service.

The simply-built, stouthearted Madden Valve wastes no water. Cost records are small, as service records are large.

The Clow Madden Automatic is only one fixture in the long list of specialized school, hospital, and industrial plumbing fixtures.

Record No. 101

After 27 years of high school service at Rock Island, Illinois — 29 Clow Madden Automatics are ready for as many more.

James B. Clow & Sons, 207 N. Talman Avenue, Chicago, Ill.

Clow Madden Automatic

Forty-Eight Styles, Heights and Types to Meet Your Requirements

MODERN SANITATION OF BUILDINGS

By LEO H. PLEINS, Architect and Sanitary Engineer

The primary object of this article is to present to Architects in as brief a form as possible, data, which the writer trusts may be of service in their office practice in the preparation of plans and specifications covering plumbing work.

The great importance of sanitary plumbing work is daily becoming more and more recognized and hence if the Architect is to give his client full service, plumbing must be given the same careful consideration as the other structural parts of the building.

For convenience of reference the article is arranged under four headings—"Drainage of Building";—"The Water Supply";—"Arrangement of Toilet and Bath Rooms"; and "Plumbing Fixtures". Space does not permit of covering all that may be said under each heading, but endeavor has been made to mention characteristic features of importance, that should be given consideration in the proper analysis of each particular problem.

DRAINAGE OF BUILDINGS.

I. Proper Fall to Main Sewer. When a survey is made the location and size of main sewer should be indicated thereon. If stubs to curb are in place their location, size and grade should be shown. The basement floor grade should always be given and also grade of main sewer at curb or street. The desirable grade for house sewer connections is $\frac{1}{4}$ " to one foot. If this cannot be obtained, the grade may be reduced but in this case the size of the tile pipe must be increased according to the length of the connection from building to main sewer.

See Table I for carrying capacity of tile pipe at varying grades. Discharge is given in cubic feet per second. Convert this into gallons by multiplying by 7.50

In the absence of any regulation as to size of house connections to main sewer, the minimum size of such connection shall be 6" tile pipe; unless a larger size is required for drainage after careful calculation. See "Size of Main House Drain," page 623.

II. When Main Sewer is Above Level of Basement Floor Grade: In this case all drainage from floor drains or fixtures in basement must be run to a sump basin and elevated by means of a pump. If no water closets or urinals are to be installed in basement the pump will be described as a **bilge pump**. If water closets and urinals are to be provided in basement, the pump will be described as a **sewage ejector**.

Obviously all waste and soil lines that may be drained by gravity, such as all drainage from floors above the basement shall be run into a horizontal line and this carried under ceiling of basement and thence through the wall connecting to the main sewer at such distance below grade as necessary to prop-

erly drain the system. The discharge from Bilge Pump or Sewage Ejector shall be connected into the horizontal line under ceiling of basement at such point inside of building as may be convenient.

If a Bilge Pump is installed—the basin for a single pump should be as follows: For pump from 10 to 30 gallons per minute, basin to be 30" diameter; for a pump from 50 to 100 gallons per minute, basin to be 36" diameter and for a pump from 125 to 200 gallons per minute, basin to be 42" diameter. For two or duplex pumps—basin to be 48" diameter for pumps from 100 to 125 gallons per minute and 60" in diameter for pumps of 150 to 200 gallons per minute capacity. All basins should be 36" deeper than lowest inlet entering the same.

If a Sewage Ejector is installed, the basin for a single ejector shall be as follows: For an ejector from 50 to 75 gallons per minute—basin to be 36" in diameter; for an ejector of from 100 to 200 gallons per minute, the basin should be 42" diameter and for an ejector of 250 to 350 gallons per minute, the basin should be 48" in diameter. For two or duplex ejectors, the basin to be 48" in diameter for ejectors of from 50 to 100 gallons per minute and 60" in diameter for ejectors of from 125 to 350 gallons per minute. All basins should be 48" deeper than the lowest inlet entering the same.

The best motive power for Bilge pumps or Sewage ejectors is a direct connected vertical type electric motor—the operation of which is automatically controlled by means of a float switch.

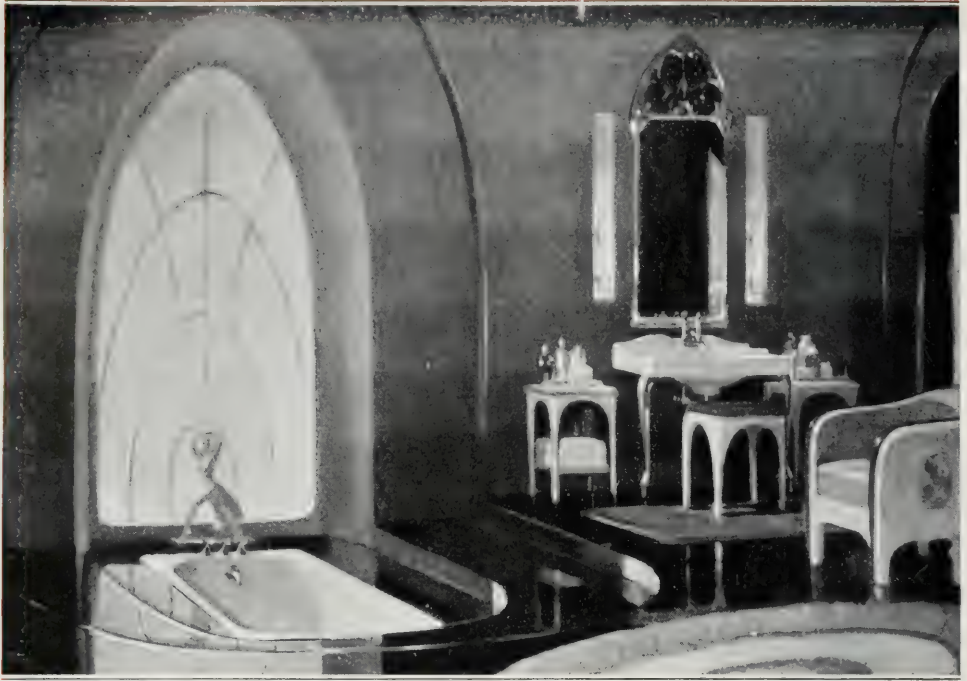
Wherever possible, both Bilge pumps and Sewage ejectors should be installed in duplicate sets. With duplex pumps the automatic control is arranged so that the same will start one pump when the water level has raised, holding the second pump in reserve, and starting the second pump when the first is not capable of handling all the water. Both pumps will then operate until normal condition has been restored. The automatic control should be provided with a four-pole transfer switch so connected up that by throwing over switch, each pump will operate at alternate periods, holding the other as reserve and in this way, equalize the wear on the pumps.

Always ascertain and specify the correct electric current and provide for service wires to within 5 feet of pump to be furnished by contractor for Electrical Work. If current is Direct give the voltage and if current is Alternating give voltage cycles and phase.

The motors for pumps are usually mounted on a cast iron or steel cover which forms a support for motors, contact apparatus etc. The basins may be of cast iron, steel, brick or concrete. If of the latter materials basins must be thoroughly waterproofed.

A swinging check valve, cast iron body, brass mounted must be placed in the horizontal discharge pipe between pump and sewer.

Blow-off drainage from boilers cannot be run directly into bilge pump or sewage ejector basins—but must always discharge into a cast iron or steel blow-off basin or muffler



“**T**HERE are no period styles in bathrooms to copy. We must originate the architecture, the equipment, the decorative treatment of this modern American room.” Thus, in the book “Color and Style in Bathroom Furnishing and Decoration” the problem of the bathroom is stated for the first time.

Setting aside tradition, this book advances new ideas for the architecture and decoration of the bathroom—ideas that at once broaden the usefulness of the bathroom and make it a worthy part, architecturally, of the home.

It pictures plumbing fixtures in all the new and exclusive “Standard” colors: St. Porchaire Brown, Clair de Lune Blue, Ming Green, Meissen White, Orchid of Vincennes, Ivoire de Medici, Royal Copenhagen Blue, Ionian Black, Rose du Barry and T’ang Red.

If you are interested in the bathroom as a new interior, it is suggested that you write for a copy of “Color and Style in Bathroom Furnishing and Decoration.”

Standard Sanitary Mfg. Co.

Chicago Showroom: 900 SOUTH MICHIGAN AVENUE

“Standard”
PLUMBING FIXTURES

tank. From this basin the drainage may then be run to bilge or sewage ejector basins, if it is impossible to drain the same by gravity.

Boiler Blow-Off Basins:

These are usually included under the heading of "Heating Work." The contractor for this work makes all connections between same, boiler blow-offs, drips, etc. When directly connected to the house sewage line the plumbing contractor makes such connection as also the venting of blow-off ba-

To determine the proper size for downspouts the following may be of service.

A rainfall of 1-inch in depth on an area of 100 square feet will give a run off of 62 gallons.

Downspouts proportioned as follows have been found in practice to give satisfactory results. For small roofs, 1 sq. inch in sectional area of the leader for each 150 sq. ft. of roof surface. For medium sized roofs 1 sq. in. in sectional area of the leader for each 200 sq. ft. of roof surface. For large roofs,

Diam eter.	Slope, or Head Divided by Length of Pipe.							
	1 in 40	1 in 70	1 in 100	1 in 200	1 in 300	1 in 400	1 in 500	1 in 600
5 in.	.456	.344	.288	.204	.166	.144	.137	.118
6 in.	.762	.576	.482	.341	.278	.241	.230	.197
8 in.	1.70	1.29	1.08	.765	.624	.54	.516	.441
9 in.	2.37	1.79	1.50	1.06	.868	.75	.717	.613
Slope	1 in 60	1 in 80	1 in 100	1 in 200	1 in 300	1 in 400	1 in 500	1 in 600
10 in.	2.59	2.24	2.01	1.42	1.16	1.00	.90	.82
12 in.	4.32	3.74	3.35	2.37	1.93	1.67	1.5	1.37
Slope	1 in 100	1 in 200	1 in 300	1 in 400	1 in 500	1 in 600	1 in 700	1 in 800
15 in.	6.18	4.37	3.57	3.09	2.77	2.52	2.34	2.19

Table I.

sins through roof. Attention in this connection is called to the requirements of the Chicago Ordinance prohibiting the discharge from basins being made into tile sewers within any building, furthermore, that the water discharged into a sewer shall not exceed 120° "F." It is necessary therefore to use cast iron pipe and in order to prevent leaks of joints, therefore cast iron hub and spigot pipe should be made with iron cement instead of lead—or flanged pipe used with asbestos graphite gaskets.

The following Table (II) may be of service to determine the proper size of basin to be provided:

Table II.

For Boiler of 25 to 75 H. P. use Basin 36" diameter by 42" deep.
For Boiler of 100 to 200 H. P. use Basin 42" diameter by 60" deep.
For Boiler of 250 to 400 H. P. use Basin 60" diameter by 72" deep.

For more than 460 H. P. use two or more basins—using the above as multiples according to horse power of boiler.

A ¾" or 1" cold water supply with control valve should be made to each blow-off basin and such connection will be found of service in cooling excessively hot blowoff water and help to condense steam vapors.

Downspouts and Downspout Drains:

In many localities the drainage from downspouts must be connected into a "Storm Water Sewer"—and not to the "Sanitary or house sewer." In either case arrangement of downspouts and drainage from same may be the same.

The best material to use for vertical inside downspouts is extra heavy cast iron pipe and fittings of proper size. All outside sheet metal downspouts should be connected into cast iron pipe and fittings above grade and cast iron pipe be run to proper depth below grade and connected to tile pipe by means of a cast iron quarter-bend.

Before making connection to roof—downspouts should be increased one size and the roof connection should be made to allow for expansion and contraction by means of a copper or lead sleeve. Roof fittings and strainers should be of cast iron and well flashed with copper or lead.

"Josam" or "Holt" roof strainers of proper size and type make the best roof strainer connections.

1 sq. inch in sectional area of the leader for each 250 sq. ft. of roof surface.

Judgment must be used in arranging downspouts so as to equalize the square feet of drainage as nearly as possible.

Outside downspouts should be avoided, especially in cold climates, as they are constantly giving trouble on account of freezing and therefore cause damage to roofs and walls.

Where roofs are covered with gravel or in localities where high winds are likely to cover roof with debris, etc., the downspouts should be provided with cast iron gravel basins or running traps with cleanouts. Gravel basins or traps must always be used when connecting downspout drains to sanitary sewers, where ordinances do not require such downspout drains to be run into outside catch basin as required by the Chicago ordinance.

Size of Main House Drain:

The size of the main house drain when serving as a combination drain (sanitary and rain water) may for all practical purposes be determined by the total surface area covered by the building or buildings and paved surfaces to be drained, by the following table, which is based on cast iron pipe. If vitrified tile sewer pipe is used the diameter of pipe as given must be increased one size for same area of drainage.

Square Feet of Drainage Area.

Diameter	Fall ¼ in. per foot	Fall ½ in. per foot	Fall ¾ in. per foot
4 inch	1,500	1,800	2,500
6 "	3,000	5,000	7,500
8 "	6,000	9,100	13,600
10 "	9,000	14,000	20,000

Back Water Valves:

Whenever the grade or size of sewer in street is such that there is a possibility of the same backing up—the house sewer must be provided with a cast iron back water valve of approved type and this valve should be placed in a manhole or otherwise located so as to be accessible for inspection or repair. It is desirable to use a back water valve having a flushing connection so that the line may be flushed.

Where water closets or urinals are located in basements and connected to horizontal house sewers which are likely to back up during heavy rains it is advisable to place a double gate valve on the branch to such



HERE is presented a Crane idea for bachelor apartments and residence hotels... a bedroom-bath. By placing the *Elegia* lavatory in the bedroom, the *Tamia* tub in a wall nook with folding panels, the *Saneto* toilet in a small enclosure, space is saved. And the well-designed sage green fixtures become a part of the furnishings and decorations. With ample closet space, the only furniture needed is a bed, a chair, and

a bedside table. With an adjoining living room a two-room suite is created of great beauty and economy. Many owners of hotels and apartments will be interested in such an arrangement. Architects, building hotels, apartments, homes, or business buildings, find it helpful to keep informed of the steady stream of Crane plumbing ideas. Write for the new book of rooms in color, *Bathrooms for Out-of-the-Ordinary Homes*.

100
Pounds Pressure



CRANE



500
Pounds Pressure

FIXTURES, VALVES, FITTINGS, AND PIPING, FOR DOMESTIC AND INDUSTRIAL USE

Crane Co., General Offices, 836 S. Michigan Ave., Chicago • 23 W. 44th St., New York

Branches and sales offices in one hundred and eighty cities

fixture in addition to the back water valve on the main drain so as to prevent sewage from backing up through these fixtures in event of the back water valve not operating properly

Flush Tanks:

Whenever the sewer in street to which connection must be made forms what is known as a "dead end" it is desirable to provide a flush tank which when filled to a proper height with clean water, will automatically discharge the contents into the sewer and thereby keep the sewer free and prevent obstructions that might otherwise occur. These flush tanks may be of two types—as illustrated herewith. Type A being suitable for flushing more than one dead end; Type B may be used if the "dead end" will be continued at some later time—in which case the flush tank may be converted into a standard manhole by taking off the cap at end of siphon and removing the latter.

Soil Pipe System:

In the order of preference for soil, waste and vent systems, we would rate: A, Brass pipe and fittings; B, cast iron pipe, caked or threaded type, with cast iron fittings; C, genuine wrought iron pipe with cast iron fittings.

The very best and most durable material for soil, waste and vent systems is full iron pipe size annealed brass pipe with red metal cast brass fittings. However, the cost of such an installation is usually greater than most owners care to invest.

Cast iron extra heavy soil pipe and fittings are the most permanent and best for soil, waste and vent systems and should be used wherever possible. While the ordinances of some cities require the use of wrought iron pipe where buildings are over seven stories in height, there is no reason why this exception should be made, as extra heavy cast iron soil pipe and fittings have been used in buildings 16-stories in height and the joints double caked as described on page 609.

The new PERMO-LOCKT hub on cast iron soil pipe, adopted as a standard by all manufacturers of cast iron soil pipe, together with the new type expansion joint, makes it possible to use cast iron pipe and fittings throughout in a building of any height with the assurance of having the best and most permanent piping system that could be installed and nothing superior to it except all brass pipe and fittings.

Threaded cast iron pipe with cast iron fittings is now being manufactured and if properly made, should prove most desirable for use where durability is a consideration.

Considering such ordinances as require the use of wrought iron pipe for soil, waste and vent systems, we would say, that unfortunately these ordinances are not specific in

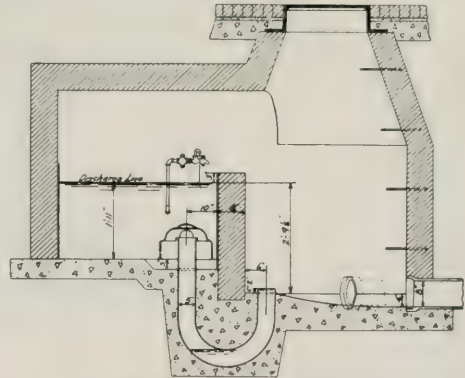
stating that when wrought iron pipe is used—it shall be Genuine Wrought Iron, hence most installations are made with commercial steel pipe, which in the opinion of the writer should never be used. In many cases where the question of cost of genuine wrought as compared to steel has been an issue—Architects and Engineers have expressed the opinion that genuine wrought pipe was not worth the difference in cost. This opinion is not shared by the writer but as stated above, I believe, that extra heavy cast iron soil pipe is the most logical material to use when all facts are taken into consideration.

If Genuine Wrought iron pipe is used for soil, waste and vent piping—all vent extensions up thru roof should be terminated with extra heavy cast iron soil pipe—the length of which should not be less than 10 feet, and more, if possible, from below roof to top of pipe.

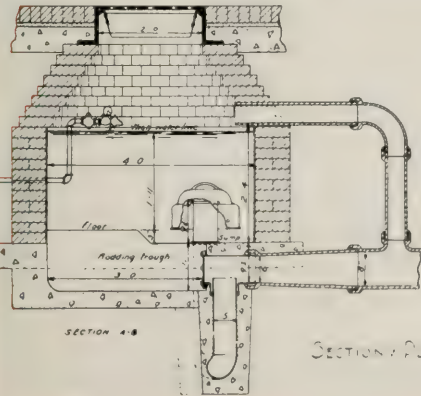
Simplicity in arrangement of soil, waste and vent stacks is desirable and it is extremely desirable to make diagrams of the system that will be of aid to the plumbing contractor as well as of being of service to the other contractors on the work. In order to be of service these diagrams must be accurately drawn and amplified by details where necessary.

The importance of a plumbing plan carefully laid out has unfortunately not been properly recognized. At the present time the cost of material is such that the Architect who is going to give his client the service for which he is paid—must more than ever consider every item that will form a part of the work.

The structural parts of a building are carefully analyzed, weights of steel columns, girders, etc., proportioned to the loads they



SECTION OF FLUSH TANK TYPE "A".



SECTION PLAN OF FLUSH TANK TYPE "B"

Imperial

ART CRODON

Watrous

Flush Valve



The handsome appearance of this tasteful 1929 design harmonizes admirably with the new Art Line and Colonial Style fixtures now being sold by leading manufacturers.

The design shown above is a development of our regular style flush valve, which is installed in many of the best known hotels and other buildings throughout the country.

THE IMPERIAL BRASS MANUFACTURING CO.

1232 West Harrison St.

CHICAGO

must carry, and all this work carefully detailed—and still the plumbing work is very rarely even laid out beyond a mere indication of the main run of soil or sewer lines—on the basement or foundation plan.

Specifications very often contain a clause requiring the successful bidder to submit a piping plan for the Architect's approval before commencing work. They might just as properly contain clauses asking the successful bidders to submit details for the elevations of the buildings, etc., etc. It is the Architect's duty to secure the best proposition possible for his client and therefore the plumbing work should be drawn—detailed and specified in such a manner that all bidders on the work may estimate on the same fixed basis and not permit them to submit figures based upon their ideas and conception of what may be required for the work. Such methods are very unsatisfactory and can only result in misunderstanding and most frequently in absolute failure at the expense of the client.

Whenever wrought iron pipe and cast iron drainage fittings are used, either asphalted in and out or galvanized—the stacks should be placed in pipe shafts so that the piping may be inspected and sections replaced when necessary without disturbing walls and partitions. All vents through roof should be of extra heavy cast iron soil pipe for a distance of not less than 10 feet below. Never place wrought iron pipe under basement floors. All such drainage pipe must be of extra heavy cast iron soil pipe and fittings.

When the building covers considerable area—it is desirable to use cast iron or waterproof concrete catch basins on the main lines and at intersections so as to permit of rodding the lines. In place of catch basins—large cleanouts may be used—which must always be the same size of pipe up to 6". Such cleanouts should be placed in manholes with cast iron covers large enough so that the lines can be rodded properly. Cleanouts must be placed at the foot of all stacks and wherever a change in direction of a horizontal line occurs. Cleanouts for best work should be of the heavy brass bell ferrule type with brass trap screw. With ferrules of iron the brass trap screw rusts in so that it is difficult to remove the same.

Changes in direction of horizontal lines should always be made on as full a sweep as possible, using Y-branches and 45° bends.

Connection between vertical stacks and horizontal drains in basement must always be made by means of Y-branches and 45° bends. Connection between horizontal lines on upper floors may be made by means of sanitary tees—although Y-branches are better.

All horizontal soil and waste lines should have a fall of $\frac{1}{4}$ " to the foot toward outlets where possible.

All horizontal vent lines must be pitched so that water of condensation will drain freely into soil and waste lines or stacks, and foot of all vent stacks must be connected into a main soil or waste line or stack.

Reventing of each plumbing fixture is generally required. The Chicago ordinance prescribes this; other localities permit circuit venting and hence, the Architect must necessarily familiarize himself with the requirements of ordinances that may be in force in the locality in which his building is to be erected.

All main vent stacks must be extended up through roof. On pitched roofs, the vents may extend above roof 6 to 12 inches, on flat roofs 18 inches to 2 feet will be better in order to be safe in case of heavy fall of snow and to avoid dirt entering same.

In the Eastern, Central and North Western States it is necessary to increase all vent stacks at least one size up to 6 inch before passing through roof. The minimum size

vent through roof should be 4 inch. All extensions through roof must be cast iron. Increasing stacks makes it possible to turn down lead or copper flashing into the pipe and leaves the extension free to provide for expansion and contraction. While caps or vent cowl should never be placed on top of vent stacks, it is desirable to use a strainer of cast iron of a removable type. Galvanized wire strainers are worthless. See Drawing.

Lead wastes are infrequently used in modern practice so we will only briefly mention them. When lead waste piping is used—it should be of a weight known as "medium" and when connected to wrought iron piping the connection must be made by means of extra heavy brass soldering nipples and a good heavy wiped joint. When connected to cast iron pipe—extra heavy brass bell ferrules must be used, wiped to the lead pipe and calked into the cast iron pipe.

JOINTING OF PIPE must be carefully done. For cast iron soil pipe—the following is a good method.

All joints of cast iron soil pipe shall be made with oakum and pure pig lead, bedded with hammer and calking iron. A gasket of well packed oakum shall be placed at the bottom of the hub extending above the rim of the spigot to prevent the escape of lead. The hub to be filled at one pouring and the lead calked with such force as to make the joint absolutely water tight under a pressure of at least 10 lbs. per square inch. All joints shall be filled at one pouring; if it fails to run full, it shall be dug out and repoured. Lead shall not be covered with paint, putty or otherwise.

Twelve ounces of lead should be allowed for each inch of diameter of pipe or fitting on which joint is made.

For buildings over six stories in height the cast iron soil pipe joints shall be double calked in the following manner: The oakum shall be well braided and before being placed in position shall be oiled and then well calked; then fill in the hub to within $\frac{3}{4}$ " of the top with molten soft pure lead and thoroughly calk. After the lead has been uniformly calked, fill in with molten lead to the top of hub and thoroughly calk—so as to make an absolutely perfect joint. All joints showing leaks under testing shall be dug out, repoured and double calked as above.

With cast iron pipe double calked as above, installations have been made in buildings 16 stories in height in which the entire system is still in excellent condition after a period of 27 years.

Joints between lead and cast iron pipe to be made by means of brass ferrules wiped to the lead pipe and calked into hub of cast iron fittings. Joints between lead and wrought iron pipe to be made by means of soldering nipples with hexagon nuts. Joints between wrought iron pipe and fittings to be screwed home into couplings or fittings without the use of any red lead or other compound.

No steam or cast bushed fittings to be used on any drainage or vent work.

Joints of tile pipe shall be made with neat Portland cement. A cleaner to be run through every length of pipe as it is laid so that no mortar used in jointing will adhere to the interior of the pipe. The connection between cast iron and tile pipe shall be made with a collar of concrete 6 inches thick and extending not less than 8 inches on each side of joint. See illustration.

All soil, waste and vent piping shall be tested. Ordinances usually prescribe the manner of testing which may be by means of water, air, peppermint or smoke on new work.



R-S Seat Operating Closets

Especially designed for schools, public buildings, hotels and industrial plants. The R-S Seat Operating Closet maintains greater cleanliness and requires less repairs than any closet outfit you can get at any price.

R-S Vertico-Slant Fountains

Sanitation, particularly *drinking* sanitation is a most important consideration in every building where many people gather. R-S Vertico-Slant Fountains are preferred by architects because they measure up to the most rigid standards of drinking sanitation.

Lips can't touch the R-S nozzle. The slight slant stream prevents water from falling back upon the jet. No places where germs can hide. Everyone may drink without danger of contamination by means of lip-contact.

R-S Vertico-Slant Fountains come in a variety of models—designed for every requirement in schools, hotels, hospitals, industrial plants and all public buildings.

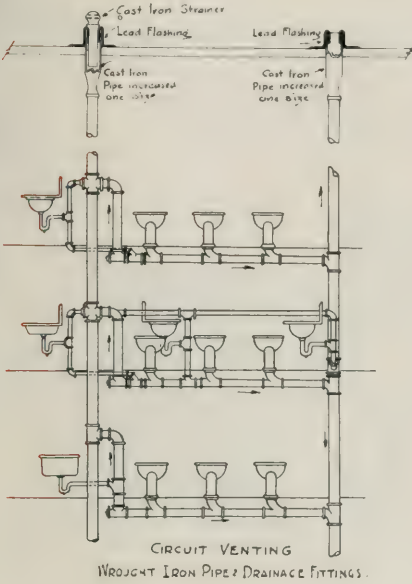
Write for catalog with complete information on R-S Sanitary Drinking Fountains, Plumbing Fixtures and Supplies.



RUNDLE-SPENCE MFG. CO.

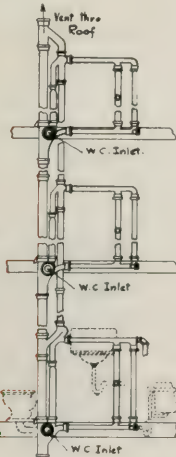
55 Fourth St., Milwaukee, Wis.

The following illustrations show several methods for reventing plumbing fixtures in accordance with the Chicago practice and also by what is known as the "Circuit Venting" system.

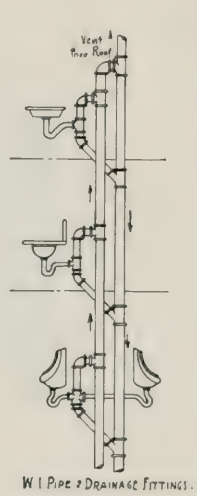


For good work both water and peppermint tests should be made and if it is desired to be absolutely certain that integrant traps of water closets, etc., are perfect a smoke test may be made after fixtures are set.

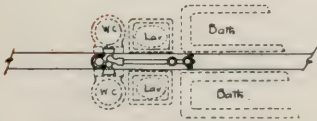
In alteration work a peppermint test must always be made.



SINK STACK, USING F&W CAST IRON FITTINGS.



W.I. PIPE & DRAINAGE FITTINGS.



BATH ROOMS (DOUBLE) ON ONE STACK, USING F&W C.I. FITTINGS.

THE WATER SUPPLY

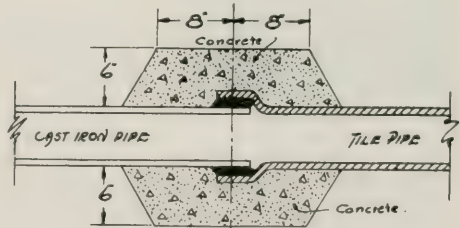
There are so many failures in the water supply system of buildings that it is evident that little study is given the problem which is one of most vital importance.

In order to provide an adequate supply of water for the particular building it is necessary to analyze the actual requirements based on a per capita consumption per day—and another factor that enters into the problem is the pressure under which the water will be delivered.

Per capita requirements may be determined by the following tables, which are the minimum:

Schools (not boarding) 50 gallons per capita per day.

Industrial Plants & Factory Buildings—50 gallons per capita per day.



METHOD FOR JOINTING C.I. TO TILE PIPE

This does not include water that may be required directly in connection with plant operation in various manufacturing processes.

Hotels, Hospitals, Asylums, Sanitariums—150 to 200 gallons per capita per day.

Homes for the Aged, Orphan Asylums, Boarding Schools—Dormitories—100 gallons per capita per day.

To the above must be added water for sprinkling lawns, etc. which must be based on the flow in gallons per minute of each $\frac{3}{4}$ " lawn sprinkler installed—allowing for a

The Seat of Permanent Service

FOR HOMES AND BUILDINGS OF EVERY DESCRIPTION



CONSTRUCTION
OF THE BRUNSWICK
WHALE-BONE-ITE
CLOSET SEAT

- D—Concealed hinge plate extends across seat, inside the core
- C—Outer covering baked on and polished to a glossy, lasting finish
- B—Two sections of laminated core runs LENGTHWISE the seat
- A—Counter sections of laminated core run CROSSWISE the seat



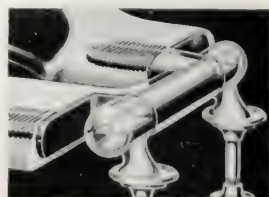
Showing Integral
Moulded Hinge

Within the past decade Brunswick Whale-Bone-It Closet Seats have been chosen by architects everywhere as sanitary units in buildings where plumbing installations demand permanent beauty and lasting strength.

Absolutely impervious to the action of water, acids, cleansers and germs, the Whale Bone-It Closet Seat functions

for years—guaranteed against corroding, cracking, chipping, crazing or warping. It is built to last!

A new feature of this sanitary unit is the Integral Moulded Hinge, pictured to the left. This hinge, reinforced with a metal die casting in one piece and covered with highly polished Whale-Bone-It is literally part of the seat itself!



Seat and Hinge Form
Unbreakable Unit

Manufactured by

THE BRUNSWICK-BALKE-COLLENDER CO.

and sold by leading plumbers and jobbers everywhere, as well as at Brunswick Branch Offices in the principal cities of the United States and Canada

General Offices: 623 SOUTH WABASH AVENUE CHICAGO

period of 3 to 4 hours for each sprinkler as a fair average.

Having determined the total quantity required for 24 hours—the next thing to determine is the proper pressure required for the work and in working this out the following must be considered:

The following tables may be used to advantage in determining the sizes of main and branch supplies for buildings:

Equalizing Table of Areas of Taps

PIPE SIZES, INCHES	½	¾	1	1¼	1½	2	2½	3	4	5
½	1	1.7	2.8	4.9	6.6	11.	15.6	24.	32.	65.
¾		1.	1.6	2.6	3.8	6.2	8.9	13.8	23.	37
1			1.	1.7	2.3	3.8	5.5	8.5	14.	23.
1¼				1.	1.3	2.2	3.1	4.9	8.	13.
1½					1.	1.6	2.3	3.6	6.2	9.7
2						1	1.4	2.2	3.8	5.3
2½							1.	1.3	2.6	4.1
3								1.	1.7	2.7
4									1	1.6
5										1

Equalizing Table of Delivering Capacities of Pipes

DIAMETER, INCHES	¾	1	1¼	1½	2	2½	3	4	5	6
½	2.27	4.88	8.49	15.8	31.7	52.9	96.9	205	377.	620
¾		2.05	3.43	6.97	14.0	23.3	42.5	90.4	166.	275.
1			1.62	3.45	6.82	11.4	20.9	44.1	81.1	133.
1¼				1.69	2.67	5.94	11.6	23.7	47.4	78.5
1½					1.26	3.34	6.13	13.0	23.8	39.2
2						1.67	3.06	6.47	11.9	19.6
2½							1.83	3.87	7.12	11.7
3								2.12	3.89	6.39
4									1.84	3.02
5										1.65

Gallons per Minute Delivered From Circular Openings at Mains Under Various Net Pressures

HEAD, IN FEET	Pounds Pressure	DIAMETER OF OPENING, INCHES								
		¼	⅜	½	⅝	¾	1	1¼	1½	2
10	4.33					33	56	91	131	224
20	8.66					46	82	123	185	328
30	13.09					57	101	158	226	404
40	17.32	7.5	16	30	46	66	112	182	262	466
50	21.65					73	130	206	299	520
60	25.95	9	20	36	58	80	143	223	329	572
70	30.28					85	154	239	348	616
80	34.65	10	23	41	64	92	164	258	370	656
90	38.98					97	173	271	391	692
100	43.31	11.	26	46	72	104	184	288	415	736
110	47.64					109	192	300	432	768
120	51.98	13.	28	50	79	114	202	316	454	808
130	56.31					118	209	325	471	836
140	60.61	13.5	31	55	81	122	217	336	491	868
150	64.97	14.	32	57	87	126	226	353	509	904

Where the water supply from City mains cannot be relied upon as sufficient in volume or pressure to supply all fixtures in the building it will be necessary to provide for reserve storage to insure a constant supply, and there are two kinds of systems to be considered—First the one most commonly known, a tank on the roof, and the other and more recent—a compression tank system with a closed pressure tank in the basement. The roof tank system is obsolete and not recommended—for the reason that in order to maintain a pressure of 20 lbs. on the top floor it would have to be elevated 50 feet above the floor to give this result. Furthermore such tanks require special provision to be made for their support, must be enclosed and generally considered from a standpoint of efficiency vs. expenditure, are out of question at the present time.

The best system is a compression tank pumping system—which we shall briefly describe. These systems may be divided in two kinds—one where the pressure of the water is so low that all must be pumped and the other where it is only necessary to increase the pressure for the upper floors—in which case the system is known as the "booster" type.

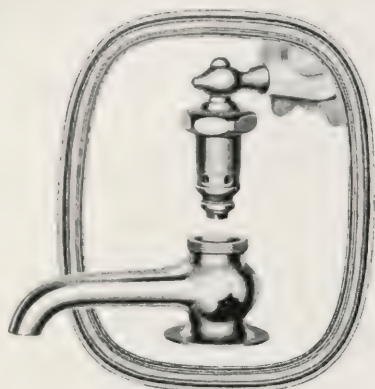
In the first type the water may be delivered from a well, cistern or city main and

depending upon the source of supply a pump designed for that special work must be used. Wherever possible, when pump is within suction lift of the water (20 feet) a centrifugal or turbine type pump with direct connected motor is the best to use. These pumps are of greater efficiency, less noisy and are more economical in operation than piston pumps.

In order to determine the proper size of pump to install we refer to the following table—which should be checked up with the per capita allowance per day previously mentioned.

To apply the above—First ascertain the number of fixtures pump is to supply—be sure to include every kind of fixture. In case any fixtures are supplied direct from city main these should be deducted. Second—Multiply the number of fixtures by the proper decimal that may apply according to the class of building.

Stores & Shops.....	.75
Office Buildings.....	.75
Factories.....	1.00
Apartment Buildings.....	.5
Hotels.....	.8
Hospitals.....	1.00
Schools.....	.8



Leaking faucets and burned-out bulbs

WHENEVER a faucet starts leaking, a MAJOR OPERATION is required to stop it. When an electric bulb burns out, anyone can tend to that.

The main reason why building managers and engineers and home owners appreciate Chicago Faucets is because anybody can repair a leak in a minute or two. Chicago Faucets have a standardized working unit that fits every faucet. It is almost as easy to remove this and substitute a fresh one as it is to replace a burned out bulb in a light socket. There are only two wearing parts—seat and washer—and both are easily replaceable at a cost of a few cents.

No Chicago Faucet will ever

wear out. The washer may need changing after several years wear. The seat itself may be renewed after a longer period. But the fixture itself will last as long as the building.

Chicago Faucets are being used to replace all other types in thousands of buildings, and no further replacement is ever necessary.

We shall be glad to furnish you with a list of such buildings so you can investigate these unusual claims.

Let us send you our catalog and a cut-out sample of a Chicago Faucet showing this everlasting unit construction.

THE CHICAGO FAUCET COMPANY

2700-22 N. Crawford Ave., Chicago, Ill.

CHICAGO FAUCETS

The table is based upon an equal number of males and females and the figures represent the gallons per minute per fixture. If the major portion of occupants are females increase pump capacity 25 per cent.

Where more than 150 fixtures are to be supplied pump capacity may be reduced 15 to 25 per cent.

Where actual water requirements have been determined (by meter or otherwise) furnish a pumping unit capable of discharging three times the actual quantity used.

Example—The total number of fixtures to be supplied by pump in an office building is 120. $=120 \times .75 = 90$. Therefore 90 gallons per minute which pump must discharge. Now to determine the head—The water must be elevated 100 feet and develop a pressure of 20 lbs. The actual head therefore will be 150 feet and to this must be added the distance of suction lift, if any, and allowance for loss of head by friction in pipe. If suction lift is 20 feet—this added to 150 makes a total of 170 and allowance for friction, 10 per cent, makes a total head of 187 feet against which the pump would have to work. The problem worked out in this manner and reference to standard catalogues of pump manufacturers will enable anyone to select the proper equipment.

When the system is of the second type or "booster" system—the head against which pump will work is determined by the following method:

Pump location to highest fixture....	100 feet
Range from minimum to maximum pressure	100 "
	200 "
Deduct City pressure 25 lbs. in feet	
—60	60 "

Pump required for a total head of..140 feet

Compression tanks should be installed of such size that the cycles of pump operation do not exceed three to four per hour. To insure this condition the tank should have a storage capacity of 25 to 30 times the capacity of pump per minute. To illustrate for a pump of 90 gallons per minute:— $30 \times 90 = 2700$ gallons per tank—1/3 to 1/2 of the storage capacity of tank should be filled with air—at maximum working pressure.

Where the city pressure is not constant and less than 20 pounds, it is advisable to install a surge tank to which the suction end of the pump is connected. The suction line to be provided with a gate valve and two horizontal check valves. The supply to the tank should not be less than 2" and the supply controlled by a float valve of approved type. The storage capacity of the surge tank should be at least ten times greater than the delivery capacity of the pump in gallons per minute.

The surge tank may be of cypress or steel and provided with a removable cover and also a 2" drain connection or larger, valved and connected to sewer.

Where the city water pressure exceeds 20 pounds and is constant, the surge tank may be omitted if the pump is of the centrifugal or turbine type, and the suction pipe may then be connected to the main service direct. However, in this case, the cross sectional area of the main service pipe must be at least 50 per cent greater than the area of the suction pipe of the pump.

Suction pipe connections must be provided with two check valves and a gate valve.

For large installations duplicate pumps should be installed.

Service Connection to Building:

For water service connection to buildings under 2" in size extra strong lead pipe may be used with corporation stops and goose-necks as required by regulations of the Water Department.

It is now possible to obtain cast iron pipe,

1½", 1¾" and 2" diameter, which is made in 5-foot lengths, hub and spigot pattern or threaded and the use of either one is highly recommended for service connections instead of lead pipe. Wrought iron or steel pipe should never be used for service connections under ground.

For service connections of larger diameter than 2" cast iron water pipe in 12-foot lengths, hub and spigot pattern of proper class or weight to suit pressure should be used.

When cast iron pipe is brought into the building and up through floor, the same should terminate in a flanged end fitting about 12" above floor.

Heavy pattern stop cocks or gate valves provided with heavy tee handle operating rods should be placed on the service connection and provided with cast iron service boxes with cast iron covers. On the inside of the building the main service must be provided with gate valves and arranged for meter connection if required by the Water Department. Provision must be made for supply connections inside fire standpipes as may be required.

From this point on the supply piping should be of the following material:

Water Supply Piping:

1. Red brass pipe, iron pipe size, properly annealed seamless tubing with red metal cast brass fittings for such work where the utmost durability is desired.

In some cases where it may be desired to effect some saving in cost, the hot water supply and return piping are specified to be of red brass and the cold water supply piping of genuine wrought iron pipe galvanized.

It is suggested that all specifications for work of the best class be drawn covering red brass pipe for the water supply lines, both cold and hot, or at least for the hot water supply and return lines, and then, if desired, an alternate bid may be asked for on the supply piping of genuine wrought iron pipe with galvanized malleable iron beaded fittings.

This will enable the Architect to take advantage of a reduction in cost if the owner desires to make such a saving, and the Architect cannot be criticized for not having specified the best material for the work.

2. Next to red brass pipe the best material to use is genuine wrought iron pipe galvanized.

3. Where cost is the sole consideration and durability of not vital importance, commercial steel pipe, galvanized, may be used.

The following suggestion is made to specification writers on the subject of Genuine Wrought Iron and Steel Pipe.

Most frequently the specification states that the supply piping shall be of wrought iron pipe and this is the cause of much misunderstanding and frequently the installation of material that is not wanted.

When the phrase, "wrought iron pipe," is used, it is commonly taken for granted by plumbing contractors that the grade of pipe known as "Commercial Steel Pipe," either black or galvanized, will be satisfactory. Perhaps in many cases it will be, but it frequently happens that the Architect intended that genuine wrought iron pipe was to be used. In order to clarify this matter it is suggested that the specifications designate whether the pipe throughout shall be genuine, wrought iron or commercial steel pipe. In case of the former, the words should be added "with the name of the manufacturer stamped on each length."

Flanges and Unions:

All pipe up to 2½" should be provided with galvanized malleable iron unions with brass seats and all pipe over 2½" to be provided with flanged unions having gaskets of asbestos graphite packing ¼" thick for best work and rainbow packing for average work.

Valves and Stops:

Valves should be heavy type brass double

QUALITY

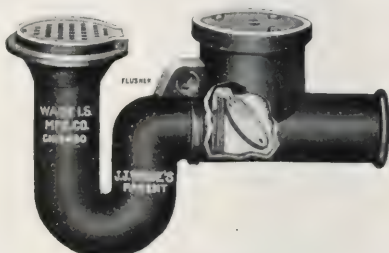


INTEGRITY

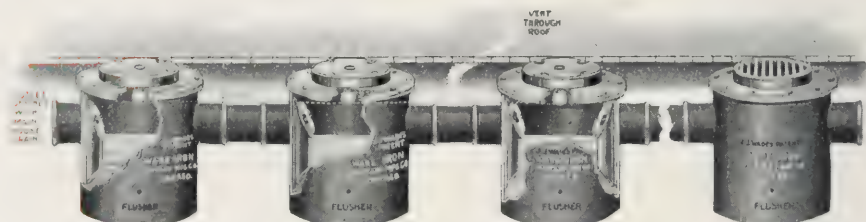
The problem of eliminating back water and flooded basements is easily solved by the use of WADE back water valves and back water valve floor drains. Accessibility, simplicity, reliability, and durability are paramount features of these drains.



C-Fig. 1



C-Fig. 18



C-Fig. 37 and 37 1/2

WADE "Accessible" triple gasoline and oil separating basins combined with typical floor drain basin. WADE cast iron basins of all kinds have been the accepted standard for years because of their rugged and lasting construction.



C-Fig. 238 1/2

A new idea in roof drain construction. WADE "Accessible" non-caulking, quickly installed slip-joint downspout head.



C-Fig. 27

The WADE water jacket grease trap, which affords the greatest cooling area for congealing grease, and which enjoys a national reputation, is the best grease collector made at any price.

WADE IRON SANITARY MFG. CO.

1717-21 South Canal Street

CHICAGO

Phone Canal 1717

gate valves up to 2½" and iron body bronze mounted flanged end for larger sizes. Valves should be of the "rising stem" type for the reason that with this type it can be quickly observed if the valve is "open" or "closed."

Globe valves of approved pattern with heavy brass body and soft rubber discs for cold water lines and composition discs for hot water lines may be used instead of gate valves on pipe from ½" to 1½". For larger pipe, gate valves should be used.

Fittings and Nipples:

Fittings for genuine wrought iron or steel water supply piping should be galvanized malleable iron beaded fittings. Plain fittings must never be used. If the pressure exceeds 75 pounds, extra heavy fittings should be used.

Nipples whether on genuine wrought iron or commercial steel pipe lines should in all cases be of genuine wrought iron. The nipple is the weakest part of any line, and for the very best work, nipples known as close or short pattern should be made of "extra strong" pipe. Genuine wrought iron nipples so stamped may now be obtained from manufacturers and makes it possible for the superintendent to assure himself that the contractor is furnishing the proper article.

THE HOT WATER SUPPLY for the building should be determined upon the actual requirements to suit the conditions of each case.

For instance—in the case of a hotel with 100 bath rooms—each containing lavatory and bath tub or shower—the demand for hot water is at a peak load—from 6:30 to 8:00 A. M. and 4:30 to 7:00 P. M. with lesser demands at noon and later at night.

To provide for such service a minimum of 30 to 40 gallons should be allowed for each bath room per hour—this with 100 rooms would mean a heater having a capacity of 3000 to 4000 gallons per hour to which must be added the quantity that will be required for kitchens, laundry, etc.

Generally speaking the following table may be used to determine size of hot water supply systems:

Schools (not boarding):

5—gallons per pupil per day for water used in lavatories,

6—gallons per minute for each shower or

25—gallons for each pupil using the shower.

Hospital:

50—gallons per day for each person and add 50% of total for kitchen—laundry and general service.

Hotels:

50—gallons per day for each bath room and add 50% of total for general service.

If there is a Turkish bath in connection with the hotel add 100 gallons for each bather—based upon the capacity per hour of the establishment.

Apartments: Allow 100 gallons per day for each apartment having not more than 2 baths, for each additional bath add 25 gallons and 25% of the total for general service.

Factories: Allow 10 gallons for each employee per day for each wash basin and 25 gallons for each employee using showers.

Boarding Schools—Asylums—Homes, etc.: Allow 40 gallons per day for each person. For showers 25 gallons for each user and add 50% of the total for general service.

For smaller installations a hot water storage tank with steam coils for winter service and hot water heater for summer service makes a satisfactory installation. The tank should always be provided with a thermostatic control to prevent overheating the water. Tanks with coils should always have a manhole at one end.

In cases where the heating system is a vapor system, the water should be heated

by means of a hot water heater the year around, as the pressure of the steam is too low to effectively heat the water by means of steam coils in the tank.

Where showers are used it is desirable to place a thermostatic hot water line control valve in the hot water supply main in order to prevent scalding. It is good practice to separate the system in Hotels, Hospitals, etc., so that the water supplied to bath tubs, lavatories and showers is controlled in this manner. It not only prevents possible scalding but saves fuel and increases the life of valves, faucets, etc., which excessively hot water materially shortens.

In larger installations—especially where both exhaust and live steam (high or low pressure) are available; the hot water system should be arranged in two units; the first a storage tank of proper size, called the primary heater, in which the water is heated by exhaust steam—from this heater it passes to the secondary heater which is provided with coils supplied by live steam under thermostatic control. The latter heater brings the water up to the desired degree of temperature at which the control is set.

Another and most economical type of heater is the instantaneous type—heated by low or high pressure—controlled by an automatic thermostatic device and using only such quantity of steam as necessary to heat the water actually used—to the temperature for which the control is set. This type of heater is very efficient and economical and is especially adapted to large installations as Hotels, Hospitals, Factories and wherever there may be a large variation in the demand for hot water throughout the day or night.

In order to ensure proper results, hot water systems must be in perfect circulation—wherever possible the overhead type system should be used with a riser to the top floor—horizontal supply mains and drop supplies to the fixtures on floors below with circulating return in basement. Hot water riser should have an air vent trap at highest point.

Pressure of hot and cold water systems should always be the same.

In some cases circulating pumps are necessary. These should always be of the centrifugal type with low speed motors and if direct current is available, motors should be provided with a variable speed control.

In conclusion of the suggestions for water supply system—I would say that in my experience most mistakes have been made in having the piping system too small and this is especially true in the case of hot water tanks and heaters.

A heater too small for the service will waste more fuel than one too large.

ARRANGEMENT OF TOILET ROOMS AND PLUMBING FIXTURES.

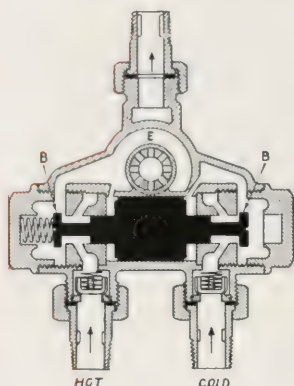
Few Architects realize how much the cost of the plumbing and heating on a building is governed by the design and location of toilet rooms. Many buildings are up several stories before the location of pipe chases or shafts are decided upon and many botched up piping jobs are the result of this neglect.

This again brings up the great need of proper plumbing plans and diagrams—showing the proper size and location of the piping and permitting the general contractor to provide chases in walls—leave openings in floors and provide pipe shafts of proper size for the work.

In residences with wood studs the partition carrying soil pipe must have at least 6" studs and a still better arrangement is to have a hollow space and use 4 or 6" studs flat wise and framed once or twice in their height as this saves cutting of studs for horizontal vent pipes.

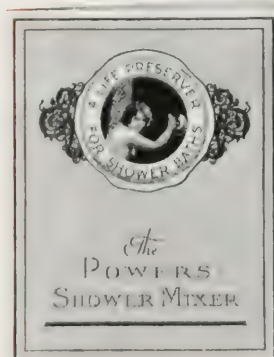
If partitions are hollow tile, 6" thick tile should be used. Thin partitions of Mackolite, Pyro Bar or similar gypsum materials make

THE POWERS SHOWER MIXER



*Pressure Equalizing Valve
Shown above in black*

This valve is a floating piston which controls and equalizes the pressures of Hot and Cold Water before they enter the mixing chamber. Prevents changes in temperature of shower caused by fluctuating pressures in supply lines due to the use of nearby plumbing fixtures. Hot Water is substantially shut off if Cold Water fails.



Phone or Write for Book

Our 20 page book contains roughing in dimensions, specification data, shows results of tests and names of hundreds of users.



Safety. This mixer is equipped with a *Pressure Equalizing Valve* described at the left, a feature found in no other mixer. Also has a Safety Stop which limits delivery temperature of water to a predetermined point. These two features eliminate unexpected "Shots" of Cold and scalding Hot Water.

Comfort. No waste of time trying to get water at right temperature. Water does not run Hot one minute and Cold the next.

Economy. Powers Mixers save water and prevent steamed-up-bathrooms, which loosen paint and plaster. They also reduce repair expense, as there are no valve seat washers on Hot Water inlet to be frequently replaced.

The Powers Regulator Co.

2796 Greenview Ave.

CHICAGO, ILL.

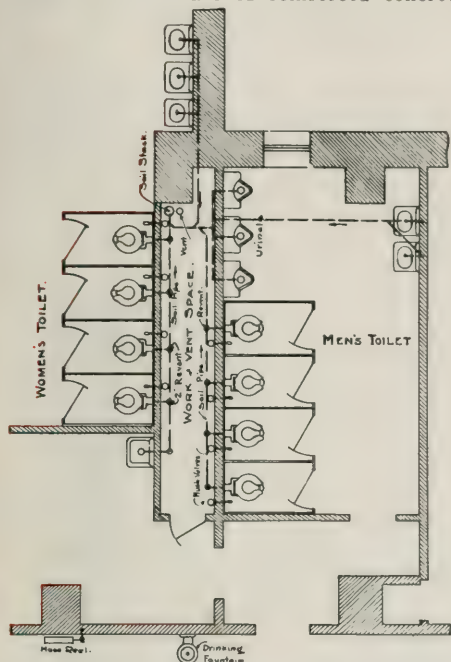
Telephone Buckingham 7100

37 years of Specialization in Temperature Control

Offices in 36 other cities

very unsatisfactory partitions for concealment of piping, as no secure anchorage can be had in same for bolts to fasten hangers or brackets for fixtures; furthermore, condensation on pipes dissolves sulphuric acid in gypsum and induces quick corrosion of metal.

With buildings of fireproof construction in which the floors are of reinforced concrete



CORRIDOR

TOILET ROOMS WITH WORK & VENT SPACE BETWEEN SAME.

the location of bath and toilet rooms must receive careful study.

There are three schemes that may be used.

The first, a pipe shaft 2'-6" to 3' in width extending up through the building—in which all piping may be placed and fixtures all provided with wastes and supply connections to wall. (See illustration.) This arrangement is very desirable for Hospitals, Schools, Hotels, Office Buildings, etc.; it makes an ideal arrangement and is economical in cost of installation and maintenance. All pipe being exposed it is easily gotten at in case of repairs.

The second is to raise the floor of toilet rooms 7" to allow for piping being concealed in floor. This is sometimes objectionable and in the case of Hospitals, Homes and Institutions should not be done.

The third is to run the piping under the ceiling of room below—either exposed or concealing the same by furring down the ceiling.

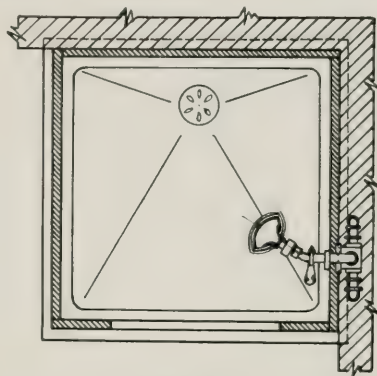
In planning toilet rooms it is most important to ascertain the exact size of the various fixtures that are to be installed—so that these will be placed properly and to the best possible advantage.

This is especially necessary in the case of bath tubs and shower stalls. If recessed tubs are used, the exact length overall, distance the ends and back will extend into wall must be considered as there is always a difference between the nominal size of bath tub and their actual overall length; the end at which the waste and supply fixtures are to come should be shown and a paneled door of proper size provided so that the fittings can be properly installed and accessible in case of repairs. When recess tubs are used—it

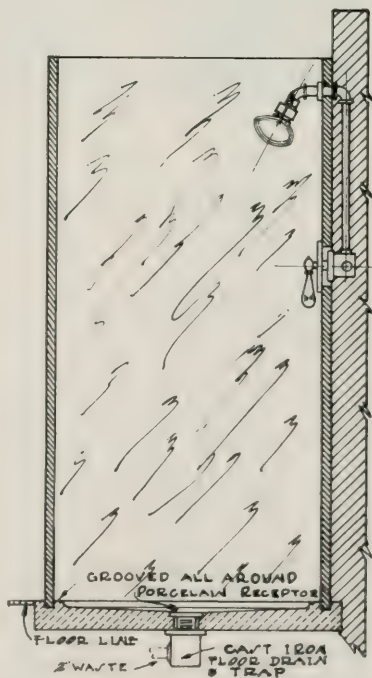
is always desirable to tile around the top of tub, as this makes a more permanent installation than a finish of hard plaster.

Shower stalls should never be less than 3'-0" x 3'-0" inside for a comfortable stall. 3'-2" x 3'-2" is the standard size adopted by plumbing manufacturers and should be used wherever possible. Stalls should be at least 6'-6" high. Solid porcelain receptors, grooved to receive marble partitions are the best and are absolutely leakproof. If marble floor slabs are used they must not be less than 2" thick and should be grooved all around to receive marble partitions.

The placing of sheet lead flashing underneath marble shower slab or tile for shower stalls on upper floors has been discontinued for the reason that very often the weight of the stall above same cracked the sheet lead



PLAN



SECTION

SANI ONYX

A VITREOUS MARBLE



The New Material for **Walls, Ceiling, Wainscoting**

SANI-ONYX is rapidly replacing plaster, tile and marble for walls, ceiling, wainscoting—interior or exterior work—because it is not affected by climatic conditions; does not crack, chip, check or discolor, even after years of hard service.

And Sani-Onyx is a material in the modern manner. New surface textures! New colors and color combinations! It outlasts the building itself, and there's never a penny to pay for repairs or re-decoration.

Write for a new free book that tells the story of Sani-Onyx, and pictures actual installations in full color.

SANITARY CONSTRUCTION CO.

1476 W. Austin Avenue
Chicago, Illinois

Division of the
Marietta Mfg. Co.
Indianapolis, Ind.

so that the installation of same as a means to prevent leaks—was a useless expense.

The best material to use for water proofing under marble or tile shower slabs is to build up three or four thicknesses of genuine asphalted felt well lapped and swabbed with asphaltum and the edges of the felt turned up at least 6" high at side walls. This is an inexpensive method and far more satisfactory than sheet lead.

A word of caution in connection with the kind of material to be used for shower stalls. Marble, slate, vitreous tile and salt-glazed brick are recommended as suitable, but the use of steel for shower stalls whether galvanized or painted is not recommended for the reason that it is not durable and its corrosion is only a question of time.

It is desirable to place the controlling valves to shower head on one side of the stall near the entrance (see adjoining illustration), so as to permit the water being turned on and tempered without wetting the bather. When a stop valve is placed in the supply to the shower head, it will be necessary to provide the hot and cold water supplies with check valves to prevent the by-pass of water from either side in event that the valves on inlet of shower are not entirely closed. When there is no valve between the inlet valves and the shower head, check valves are not absolutely necessary.

All shower heads should be placed 6 feet above floor for adults and 5' 6" for school showers provided with an adjustable ball joint by means of which the angle of the shower head may be changed as desired. Shower heads arranged in this manner give better results and will not wet the bather's head unless he so desires.

When thermostatic or anti-scalding shower valves are used, it is always desirable to place on the hot and cold water supply line for each, a loose key compression shut off by means of which the supply can be controlled, which is necessary if the pressure is very high or the pressures of hot and cold water are not equal.

When plain compression type control valves for showers are used in place of thermostatic or anti-scalding valves—a thermostatic hot water control valve should be placed on the hot water supply line to the showers and set so as to prevent the hot water exceeding 110° F. in temperature.

The placing of plumbing fixtures against outside walls should be avoided. It is very unsatisfactory. Even if the supplies are carefully covered there is always danger of freezing. The custom of placing bath tubs under outside windows is most objectionable. This has been commonly done in apartment house work. A little study of grouping would have produced better results.

In public toilet rooms the arrangement of water closet stalls must be well considered. Where a number of these are to be installed the size of the stalls must be determined. The adopted standard width is 2'-6" centers for schools—they should not be less—but

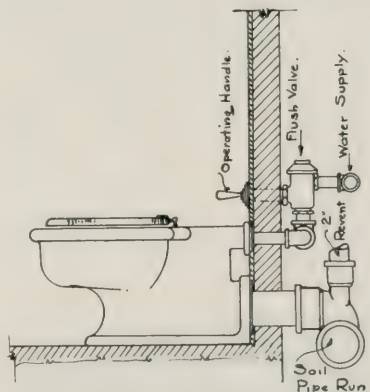
may be more. For adults the stalls should be 2'-10". Three (3) feet is the greatest width that should be used. To make them wider would be waste of space. The depth inside should not be less than 4'-6" with doors swinging in. This depth will allow the standard width—2 foot door to well clear the front of the closet bowl.

In factory, etc., and school work, especially primary grades, it is better to omit doors entirely and in this case the stalls need not be more than 3 feet, or at the most 3'-6" in depth.

If possible all flush tanks, piping, etc., should be concealed in a work space in rear of closet stalls. The wall of work space being formed by the backs of partitions or a built up wall as desired. Frequently this same work space is also utilized as a vent space, providing the back of each stall with a vent opening, protected by a ventilating hood or register face. This makes a most desirable arrangement for ventilating large toilet rooms—especially adapted for schools, asylums and all public toilet rooms.

The water closet stalls may be of marble, slate or steel according to the class of work. Steel partitions are very satisfactory and excellent for school and factory work.

The bottom of all partitions should be 12 inches above the floor. When marble is used the pilasters should be 1½ or 2 inches thick and grooved to receive the partitions. The backs should be cut out to receive the partitions and a top rail of marble corresponding in thickness to the pilasters and 3½ or 4" high extend along the entire front. The bottom of rail should not be less than 6'-6" high for schools and 7 feet for public toilet rooms. This arrangement does away entirely with brass floor and top standards and



WATER CLOSET. WALL OUTLET.

all metal angles—very desirable for the reason that nickel plated brass work becomes tarnished very quickly and is rarely given the care it requires to keep the same in good condition.

If wood doors are used they should preferably be of the type known as "sanitary", perfectly flush without panels. The standard



N. C. T. Vitreolite Dispenser



Norfold Vitreolite Towel Cabinet

For the Modern Building

NORTHERN Towel and Tissue Cabinets are made from quality steel with a durable finish. They have no mechanical parts to get out of order. Towel Cabinets work on the gravity feed principle. Tissue dispensers have a strong spring guaranteed for life.

The Norfold Cabinet is made in two styles, the drawn steel design, with rounded corners is finished in baked on Vitreolite white enamel or enameled gunmetal green. The built up type with square corners is finished in white enamel and gunmetal green.

The strong Northern Towel Cabinet for standard fold towels comes in white enamel and gunmetal green.

The Northern Cabinet Tissue Vitreolite dispenser, shown above is finished in a lustrous baked on Vitreolite white enamel or in non-tarnishing chromium plate.

The standard Northern Cabinet Tissue dispenser with the square corners is finished in gunmetal green or white enamel.

These dispensers will be in keeping with the finest buildings. They are economical in operation and moderate in first cost.

Ask for samples and prices.

The Northern Paper Mills

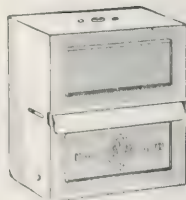
914 Wrigley Bldg., Chicago, Ill.

Resident representatives in principal cities.

Home office and mills at Green Bay, Wisconsin.



Standard Towel Cabinet



Gunmetal N. C. T.
Fixture

size is 2 feet wide, 5 feet high and 1½" thick. They should be provided with an adjustable N. P. box spring hinge and blank with check, door latches and stops and should always swing in, with spring set to hold the door open when not in use.

While on the subject of water closet stalls a word of caution regarding the floor is apropos. It frequently happens, especially in school and factory work, that the floors of toilet rooms are pitched toward a floor drain and whenever this is done the contractor doing the flooring work should be cautioned to keep that portion of the floor on which the water closets are to set perfectly level and establish his break line at least 3 inches forward of the front of the base of the water closet bowls. Unless this is done the plumber when setting the bowls will level them up with cement in order to obtain an even bearing and the cement under the base of the bowls either causes them to crack on account of unequal expansion and contraction or because of improper support throughout the entire base, the unequal strain on the ware will cause cracks.

For connecting water closets with floor outlets to soil pipe or fittings only cast iron bends of an approved type should be used—with a gasket of asbestos, graphited.

Connection between waste outlets of water closets with wall outlets and soil pipe should be made by means of heavy combination lead and iron ferrules, one end caulked into hub of cast iron fitting, the other wiped to a brass closet flange and asbestos graphite gasket.

This method of connection does not cover the wall hung type closets now being used of which each special type is provided with a special designed form of attachment to the soil pipe or stack.

Now as to the type of water closets to be used. There are today practically only two styles—one known as a siphon jet bowl, the other a washdown with jet. There are of course a large number of various special type bowls in the market but they are modifications of the above types.

The siphon jet bowl is the best to use on account of its more quiet action in flushing and also for the reason that the interior of the bowl presents less fouling surface, owing to the larger water surface.

The greater the cross-sectional area of the siphon limb the better the operation of the bowl. The minimum diameter of the siphon limb should be 2½" and 3" is better. The more uniform the passage is the less danger of stoppage. **All bowls should be tested out under water before shipment by the manufacturer—for two reasons: one to determine whether the ware is free from cracks—called "dunts" by the potteries, the other to be certain that the construction of the bowl is perfect.**

In many localities the water contains incrusting ingredients that may cause clogging up of the jet tubes in time. Such conditions may be remedied by emptying the water contained in the bowl and pouring a pint or more of "Commercial" Muriatic acid into the bowl. The acid will dissolve the solids in

the jet opening in about ½ to ¾ of an hour. However, where the water is extremely bad—it is advisable to use the washdown type of bowl with jet, which is not as apt to become stopped up as the jet openings are larger than in the siphon jet type and the tube has no pocket in which deposits can accumulate.

Where it is necessary to practice economy in the selection of fixtures—it is advisable to use washdown water closets with jets. For Schools and Factories this style is generally used.

There is another type of closet used today which is a composite of the siphon jet and washdown bowls. This bowl is known as the "reversed trap type" and when correctly designed and properly made, makes a very satisfactory closet. It has less fouling surface than the washdown bowl and is siphonic in action.

The conditions that are to be met in each case must necessarily determine the particular kind of closet that should be used. Also whether the bowls should have extended lips, floor or wall outlets, have low down tank, or flush valves or flushed automatically by seat operating valves. No fixed rule may be prescribed for such selection, which can only be made according to requirements of the work itself.

In the selection of water closets consideration must be given as to the manner in which the closets are to be flushed. Water closets with high tanks or low down tanks require a ½" supply connection, whereas these fixtures if operated by means of flush valves—require 1 to 1½" supply connections to each flush valve. Water closets with automatic seat operating valves require ½" supply connections as a rule.

Where there is more than one water closet in a row or battery, the main supplies for such battery must be of a size that will adequately supply all fixtures. Reference to the following table will be of service:

Table of Branch Supplies for Water Closets.

The following table will be of service to determine the proper size of branch supplies for water closets from 1 to 12 fixtures in a battery. The size of pipe is based on a pressure of from 20 to 40 pounds.

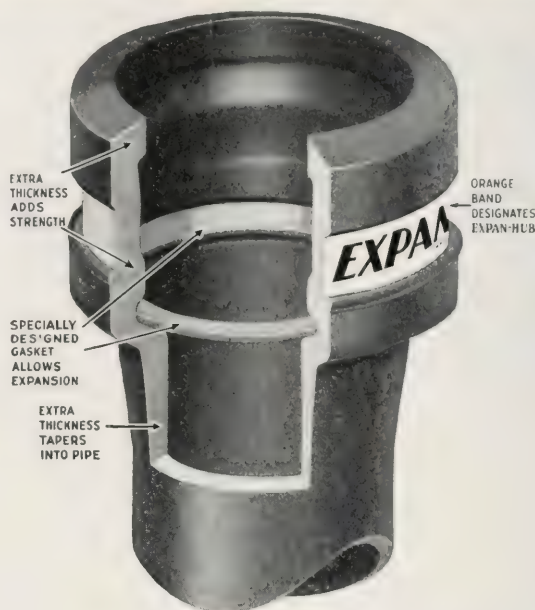
For Automatic Seat Operating Water Closets or Water Closets with Low-Down or High Tanks. Inlets ½".

Number of Closets	Size of Branch, Inches
1	¾
2	¾
3	1
4	1
5	1½
6	1½
7	1½
8	1½
9	1½
10	1½
11	2
12	2

Each branch connection to closet valve or tank shall be ½ inch.

For Water Closets with Flush Valves Having 1¼" Inlets.

Number of Closets	Size of Branch, Inches
1	1¼
2	1½
3	2
4	2½
5	2½
6	2½
7	2½
8	2½
9	3
10	3
11	3
12	3



THE GREATEST IMPROVEMENT *in soil pipe in 50 years*

EXPAN-HUB Soil Pipe—with its specially designed gasket in the hub of each length—completely solves all Expansion, Contraction and Settlement Problems.

For as the stack expands, or the building settles, this gasket permits a telescopic action in the hub, which PREVENTS THE STACK FROM BUCKLING AND KEEPS JOINTS GAS TIGHT PERMANENTLY.

Manufactured and Sold by

Alabama Pipe Company
122 S. Michigan Blvd.

Stringer Bros. Co., Inc.
1100 W. 38th Street

EXPAN HUB
SOIL PIPE



Trade

Mark

Each branch connection to flush valve shall be $1\frac{1}{4}$ or 1 inch, according to style of valve used.

In order to prevent water hammer in pipe lines, it is desirable that the supply connection for each flush valve be provided with an air chamber full size of the branch supply and at least 2' in length. In case of a battery of closets, the air chamber may be placed at the extreme end of the horizontal supply branch, and in this case should be at least 2' in diameter and 2' in length for a battery of six to ten. If there should be a double battery of closets placed back to back, the supply branch for each battery should be connected together and the air chamber placed at this point. In that case it would be well to provide an air chamber larger in diameter and at least 4' long.

Refer to table of "Delivering Capacities of Pipes" on Page 511 for sizes of branches where inlets are other than $\frac{1}{2}$ " or $1\frac{1}{4}$ ".

The water pressure must also be carefully considered for flush valves and automatic seat operating valve closets. For the former the minimum should be 15 lbs., and for the latter 20 lbs., at each bowl.

Consumption of water is another item to be considered. Tank closets will use 6 to 8 gallons per flush; those with flush valves from 6 to 8 gallons according to the pressure and automatic seat operating closets will only use $2\frac{1}{2}$ to 3 gallons per flush.

Now regarding urinals—At present there are three types. The solid porcelain or vitreous urinal 18 and 24" wide which sets into floor and has a lipped extension base the top of which is usually set flush with floor. Then there is the old style wall hung urinals—either washdown or siphon jet type.

The first type mentioned is the one most generally used except for factory and school work. The urinal is the most objectionable of all plumbing fixtures and unless it is properly ventilated and gutters contain a sufficient quantity of water for proper dilution of the urine, the fixture becomes a nuisance.

When setting solid porcelain urinals into the floor a depth of 4" is required to bring the top of the drip receptor flush with the finished floor. Care should be taken to set these in accordance with instructions of the manufacturers. They must never be solidly set in a cement grout; an inch or more of dry sand should be put under same and a strip of expansion joint composition placed on the front edge and exposed sides so the concrete sub-base of floor will not adhere. The finished tile, terrazzo or cement may be run up against the porcelain ware.

Regarding the other fixtures such as bath tubs, lavatories, sinks, slop sinks, etc., space will not permit going into details. The catalogues of manufacturers generally give all information necessary regarding same.

Obviously, the main factor determining the selection of fixtures should be quality, which implies the longest possible service and therefore the cheapest in the end. Fixtures in order to prove satisfactory must possess strength and the greatest resistance possible to effects of alkaline and mineral waters and other liquids or material likely to cause stains, or prove destructive to the glazed or enameled surface with which they come in contact. It is always the duty of the architect to make such recommendations to his client as will absolve him from all blame where defects develop in material, that has been used against his recommendation.

The class of the work in question should determine the character of the material to be used throughout, and naturally this will equally apply to the plumbing fixtures.

Vitreous ware of the best quality, is considered the best and most durable material to

use. In addition to water closet bowls and urinals of certain types, it is furnished for lavatories, drinking fountains, slop sinks and kitchen sinks in certain sizes.

Solid porcelain for larger fixtures, such as bath tubs, stall urinals, slop sinks and kitchen sinks, can be had in Classes A and B. Careful selection is necessary in order to obtain the best and while the danger of crazing of the surface glaze has been greatly reduced by improvements in methods of manufacture, it still remains a point to consider in making a selection.

Quite recently, manufacturers of enameled cast iron ware have introduced a new process of enamel, which they claim will positively resist stains and the surface retain its gloss indefinitely. If this proves to be the case, it will be a great achievement, especially so, if the cost will be but little more than the present best quality of enameled cast iron ware.

By all means provide a clause in your specifications that all fixtures must be stamped with the name of the manufacturer and each piece properly labeled as to quality and showing individual inspection.

Brass Goods:

In order that the Architect may be assured of obtaining durable material great care should be used in the selection of the brass goods which include faucets, bibbs, stops, and supply piping for lavatories, bath tubs, showers, sinks, etc.

For first class work the following clause should be inserted in the specification.

"All brass work shall be red metal brass of a composition in accordance with the Navy Department standard—which is 85% copper, 5% tin, 5% zinc and 5% lead. All tubing such as flush pipes, etc., shall not be less than No. 14 gauge and all supply pipes shall be full iron pipe size, annealed, red brass. All nickel plated work shall be of the highest quality and subjected to the nickeling process for a period of not less than one hour. All faucets, valves and bibbs shall be provided with stems having movable loose discs. Discs to be of special hard fibre and not so called composition and all discs must have edges encased by a brass protecting rim.

Chromium plated metal is now being extensively used in place of nickel plated work. For the very best and most permanent untarnishable material "nickel silver" remains without equal.

"For all concealed valves or stops the operating part must be removable from face of wall and the discs the same as above and the seats of removable, renewable, type."

While on the subject of stops a few words are apropos. The supply connections to every fixture should be provided with stops either exposed or concealed type. The initial cost of stops is very small when compared to the cost of repairing damage to floors, plaster, ceiling and decoration caused by leaks.

Cost today, more than ever, is an important factor in considering the quality of plumbing fixtures that should be used. However, it would be very poor judgment to sacrifice quality of material in any line on account of cost. The work of the Architect is not for today, but for tomorrow, and he who builds well in all things will profit more than one who builds poorly, and hence, now more than ever skill in design and knowledge of materials and their proper use will be required of the Architect to secure results.

Nothing will cause as much annoyance and require as constant repairs as a poorly designed and cheap installation of plumbing. Repair bills are a constant reminder to the owner of mistakes made by the Architect, who failed to give in full the service for which he was paid.



Palm Olive Building, Chicago

Holabird & Root, Architects

Telephone: Haymarket 1800

M. J. CORBOY CO.

Plumbing, Drainage, Gas Fitting

405 N. Desplaines Street

CHICAGO

SOILWASTE AND VENT PIPES IN PLUMBING SYSTEMS

This article is written with the object of presenting information in a convenient form relative to pipe sizes in plumbing systems, for the benefit of those who are interested. More detailed information may be obtained in the report of the Committee, hereafter referred to.

It has long been a recognized fact that definite information was lacking on which to base proper pipe sizes for soil, waste, drain, and rain water pipes within buildings. Architects and Engineers especially have been aware of the lack of uniformity in design and method of installing fixtures and piping systems in plumbing.

The war hastened a concentration of forces to bring about standardization in this respect. Early in 1921, Secretary of Commerce Herbert Hoover set in motion the work of a Committee appointed to bring about a standardization of building practices. Sub-committees were appointed, and the work of bringing about more uniformity of design and practice in plumbing was allotted to a sub-committee composed as follows:

- George C. Whipple, Chairman,
Professor of Sanitary Engineering,
Harvard University.
- Harry Y. Carson, C. E.,
Research Engineer, American Cast Iron
Pipe & Foundry Co.,
Birmingham, Alabama.
- William C. Groeniger,
Consulting Sanitary Engineer,
Columbus, Ohio.
- Thomas F. Hanley,
National Association Master Plumbers,
Contracting Engineer, Chicago, Illinois.
- A. E. Hansen,
Hydraulic and Sanitary Engineer,
New York City, N. Y.
- James A. Messer,
President, James A. Messer Company,
Washington, D. C.
- Albert L. Webster,
Consulting Engineer,
New York City, N. Y.
- William J. Spencer,
Secretary-Treasurer, Building Trades
Council,
American Federation of Labor, Washing-
ton, D. C.

Meetings were held at Washington, and after being duly organized, the Committee decided that its first duty was to define "plumbing." The discussion leading up to this is well worth reading. The definition is:

"Plumbing is the art of installing in buildings the pipes, fixtures, and other apparatus for bringing in the water supply and removing liquid and water-carried wastes."

Why is plumbing, and why legislate for its proper installation?

It is conceded that life in American cities is practically intolerable without a water supply and water-borne waste carriers in buildings, hence the definition just quoted.

The Committee's report says that—

"The air in sewers and drain often contains gases resulting from the decomposition of excreta, soap, fats, and other wastes, together with gases from mineral oils which may come from garages, streets, and industrial establishments. Illuminating gas may also find its way into sewers through leakage. Among these gases may be found methane, sulphuretted hydrogen, and carbonic oxide. In large amounts these gases are poisonous to the human system, and there are physiological objec-

tions to breathing them even in small quantities. Hence, the air of sewers or drains should be kept from entering buildings intended for human habitation or occupancy by the use of proper plumbing installations and by suitable ventilation of the rooms or compartments in which the plumbing fixtures are located. The smell of these gases and other emanations from decomposing organic matter is naturally repugnant to human beings. It not only offends the sensibilities, but may produce shallow breathing, headache and even nausea.

"In addition to the above facts, it is important to consider the bacteriological aspects of sewer and drain air, a subject upon which there has been some misunderstanding. In recent years bacteriologists have made studies which have thrown light upon this subject. They have shown by experiment that while sewage often contains disease-producing bacteria derived from human excreta and body wastes, these bacteria are rarely found in the air which escapes from sewers and drains. Hence, it has been argued by some that escaping sewer air has no influence on health. The committee does not agree with this conclusion. Health may be influenced by factors which do not cause specific diseases, for there are chemical and physiological as well as bacteriological factors involved. The investigations thus far made by bacteriologists should be considered to be merely a beginning of larger and more complete investigations, which will doubtless be made as the science of bacteriology advances. The committee is of the opinion, therefore, that until further light on this somewhat obscure subject has been obtained, the escape of sewer air from the house-drainage system, at frequent intervals or in considerable quantities, threatens the health of the building's occupants.

"The temporary losses of water seal in traps, which rarely occur and which are immediately replaced, do not involve any great danger to the health of the occupants, * * * * * but where a loss of seal is likely to be of frequent occurrence and not readily replaced, or where breaks in the system admit sewer air continually to a building, the health of the occupants is subject to the dangers heretofore described.

"For the above mentioned reasons, regulations governing the installation of plumbing have been established by law in many places. These regulations have been potent in improving living conditions throughout the country; in fact, they have even set the standards for those places where plumbing is not under public control.

"The committee believes that good plumbing is a matter which concerns health. Government has the right to protect the people's health, * * * * *"

This is the basis upon which is built all laws, rules, and regulations concerning plumbing installations within buildings.

The National Plumbing Code, prepared and submitted in the report of this Committee, is well worth a place in every architect's library. It is designed so as to apply in every part of the United States, and is national in its scope. The primary object was to standardize plumbing in small residences. That this has been well done is obvious.

In the studies of cause and effect of air movements, carrying capacities, and the effects of corrosion in soil and waste pipes, much information was obtained which de-

MURPHY PLUMBING COMPANY

Contractors

*Plumbing - Heating - Drainage
and Gas Fitting*



High Grade Installations



1720 So. Michigan Avenue
CHICAGO



Telephone Victory 4310

terminated the basis upon which were built the following tables of pipe sizes. This has been an aggravating problem for years, and the work of this Committee will be appreciated by those who have been obliged to grope in the dark, or who have learned by bitter experience how difficult it is to carry water and eliminate air pressure in the same pipe.

EXPERIMENTS

Numerous practical experiments were carried out by the Bureau of Standards at Washington and by the Department of Sanitary Engineering at Harvard University, which aided this Committee in forming its conclusions. These experiments confirmed the findings of those whose experiences in tall building construction have been previously related.

The tables of pipe sizes are on a fixture unit basis, which is the most convenient form to use.

TABLES OF PIPE SIZES

“Fixture Unit: The following table based on the rate of discharge from a lavatory as the unit shall be employed to determine fixture equivalents:

	Fixture Units
One lavatory or wash basin.....	1
One kitchen sink.....	1½
One bathtub	2
One laundry tray.....	3
One combination fixture.....	3
One urinal	3
One shower bath.....	3
One floor drain	3
One slop sink.....	4
One water-closet	6

“One hundred and eighty square feet of roof or drained area in horizontal projection shall count as one fixture unit.

“Soil and Waste Stacks: Every building in which plumbing fixtures are installed shall have a soil or waste stack, or stacks, extending full size through the roof. Soil and waste stacks shall be as direct as possible and free from sharp angles and turns. The required size of a soil or waste stack shall be independently determined by the total fixture units of all fixtures connected to the stack in accordance with the following tables:

Waste Stacks

Number Fixture Units	Diameter of Stack Inches	Permitted Length Feet
1	1¼	45
2 to 8.....	1½	60
9 to 18.....	2	75
19 to 36.....	2½	105

Soil and Waste Stacks

Number Fixture Units	Number Water-closets or equivalent	Diameter of Stack Inches	Maximum permitted length Feet
37 to 72.....	1 to 12	3	150
73 to 300.....	13 to 50	4	225
301 to 720.....	51 to 120	5	300
721 to 1,080.....	121 to 180	6	400
1,081 to 1,920.....	181 to 320	8	600

“Restrictions: No water-closet shall discharge into a stack less than 3 inches in diameter. Not more than three water-closets or their equivalent in fixture units shall discharge into a 3-inch stack from one 3-inch branch, and not more than two such branches may connect to a 3-inch stack at the same point or level.

“Vents, Required Sizes: The required size of main vents or vent stacks shall be deter-

mined on the basis of the size of the soil or waste stack, the number of fixtures or fixture units connected to the soil or waste stack, and the developed length of the main vent stack in accordance with the following tables:

Waste Stack

Diameter of Stack (Inches)	Fixture Units on Stack	Dimensions of Vent Diameter Inches	Maximum Length Feet
1¼.....	1	1¼	45
1½.....	2- 8	1¼	35
1½.....	2- 8	1½	50
2	9-18	1¼	30
2	9-18	1½	60
2	9-18	2	75

Waste Stack

Diameter of Stack (Inches)	Fixture Units on Stack	Dimensions of Vent Diameter Inches	Maximum Length Feet
2½.....	19-36	1¼	25
2½.....	19-36	1½	45
2½.....	19-36	2	60
2½.....	19-36	2½	105

Soil or Waste Stack

Diam. of stack (Inches)	Fixture units on stack	Water-closets only	Dimensions of vent. Diameter Inches	Maximum length Feet
3.....	6- 18	1- 3	1½	20
3.....	6- 18	1- 3	2	60
3.....	19- 42	4- 7	2	45
3.....	19- 42	4- 7	2½	150*
3.....	43- 72	8- 12	2	30
3.....	43- 72	8- 12	2½	90
3.....	43- 72	8- 12	3	150
4.....	24- 42	4- 7	2	20
4.....	24- 42	4- 7	2½	45
4.....	24- 42	4- 7	3	100
4.....	43- 72	8- 12	2½	30
4.....	43- 72	8- 12	3	75
4.....	43- 72	8- 12	3½	150
4.....	43- 72	8- 12	4	300
4.....	73- 150	12- 25	3	60
4.....	73- 150	13- 25	3½	120
4.....	73- 150	13- 25	4	225
4.....	151- 300	26- 50	3	20
4.....	151- 300	26- 50	3½	50
4.....	151- 300	26- 50	4	100
4.....	151- 300	26- 50	5	225*
5.....	301- 480	51- 80	2½	20
5.....	301- 480	51- 80	3	50
5.....	301- 480	51- 80	3½	100
5.....	301- 480	51- 80	4	175
5.....	301- 480	51- 80	5	300*
5.....	481- 720	81-120	3½	25
5.....	481- 720	81-120	4	50
5.....	481- 720	81-120	5	125
5.....	481- 720	81-120	6	300*
6.....	721- 840	121-140	3	20
6.....	721- 840	121-140	3½	40
6.....	721- 840	121-140	4	75
6.....	721- 840	121-140	5	225
6.....	721- 840	121-140	6	400*
6.....	841-1,080	141-180	4	50
6.....	841-1,080	141-180	5	125
6.....	841-1,080	141-180	6	300
6.....	841-1,080	141-180	8	400*
8.....	1,081-1,920	181-320	4	20
8.....	1,081-1,920	181-320	5	60
8.....	1,081-1,920	181-320	6	150
8.....	1,081-1,920	181-320	8	600*

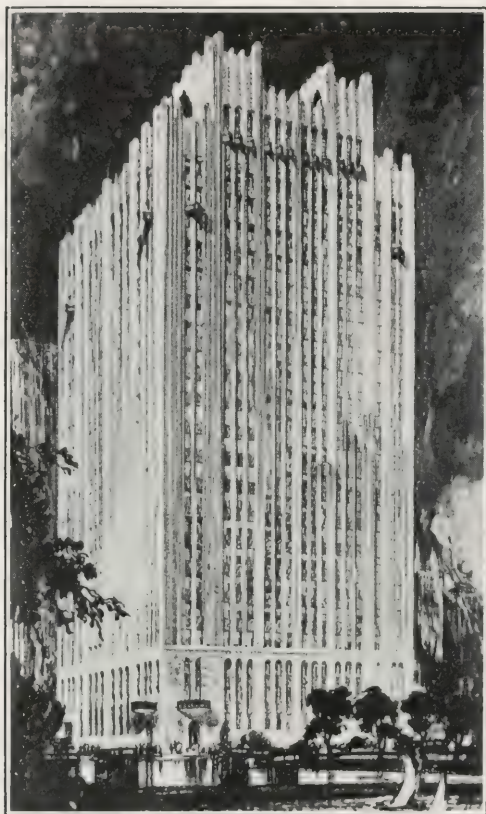
* Limit in height of soil stack but not in length of vent if greater is required.

NOTE:—The capacities and vent stack requirements for 4, 5, 6, and 8 inch soil stacks are extrapolated from data obtained for 2 and 3 inch stacks with liberal added factors of safety to provide for all necessary elbows

THEATRES AND PUBLIC INSTITUTIONS

**COMMERCIAL
AND INDUSTRIAL
BUILDINGS**

**HOTELS
AND APARTMENT
BUILDINGS**



Powhatan Co-operative Apartment Building, 5000 Chicago Beach Drive, Chicago

Robert S. DeGolyer & Company, Architects

E. J. YOUNG & CO., Inc.
Plumbing Contractors

416 West Erie Street

CHICAGO

Telephone Superior 3150

or changes in direction in the vent stack. They are believed to represent safe installations and closer approximations to actual requirements than any tables now available.

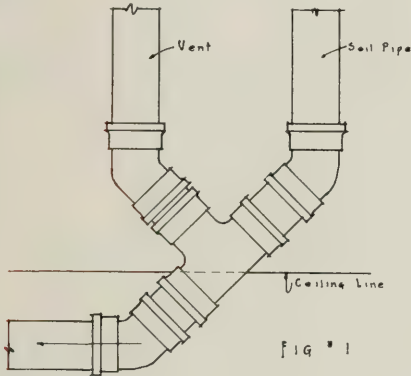
"Branch and Individual Vents: No vents shall be less than $1\frac{1}{4}$ inches in diameter. For $1\frac{1}{4}$ and $1\frac{1}{2}$ inch wastes the vent shall be of the same diameter as the waste pipe, and in no case shall a branch or main vent have a diameter less than one-half that of the soil or waste pipe served, and in no case shall the length of a branch vent of given diameter exceed the maximum length permitted for the main vent serving the same size soil or vent stack."

NOTE.—See article on Plumbing Design in Tall Buildings, Page 517, 1922 Year Book.

Study of the reference to a full size cross connection between soil or waste line and vent is well worth while in connection with the above tables.

Good practice would not permit the installation of a vertical waste carrier two to four

FIG. 1.



hundred feet long without a break in it. At the angle fitting in such a break a full size connection between soil or waste line and vent should be made as suggested in the 1922 Year Book.

Method of connecting a main vent line into the bottom of a soil or waste line in a tall building to prevent excessive air compression.

The falling column of water hugs the bottom of the 45° angle extension and allows the air to separate from the water and freely escape up the vent line.

Experiments and actual installations prove this method to be correct.

Another method of connecting a main vent at the bottom of a soil or waste pipe. This is a stock fitting for cast iron pipe.

FIG. 2.

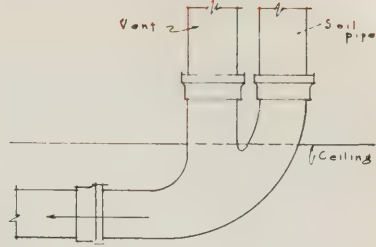


Fig. 2

Operation is the same as that in Fig. 1.

SEWERS AND DRAINS.

A table of pipe sizes for house drains laid at a given grade is contained in the proposed code of plumbing standards of the Hoover Committee.

The sizes so specified differ from those adopted by the Bureau of Sewers in this city and which have been in use for several years.

A discussion of the relative merits of these two tables of pipe sizes would be distinctly out of place here.

There is a difference of opinion among men of experience as to which is correct. We are not aware of any instance where house drains installed in accordance with the tables set up by the Bureau of Sewers have been found inadequate.

The latter table of sizes is for a combined system of drainage.

It is safe to say that the amount of domestic sewage discharged into a drainage system during the period of a heavy rain is negligible in so far as carrying capacity of the drain is concerned.

Real trouble develops when a street sewer is filled to its capacity. Then the size of a house drain may as well be 6" as 8" or larger, for the air compression is the same in either case, and it is air compression that causes fixture traps to discharge their contents over the floor.

Drainage in Chicago is a much more difficult problem than in any other large city.

The flat plain upon which this city is built does not permit steep grades in sewers and a rapid flow of storm waters.

The designer of drainage systems in buildings must therefore so construct his house drains and their connections to down spouts and plumbing systems as to prevent back pressure and consequent flooding of premises.

The most successful methods are those which provide for a separation of storm water from domestic sewage within the walls of high buildings.



THE finishing of the interior trim of this imposing building was accomplished in a minimum of time because "61" Spraying Lacquer, *Dull Finish*, was used. The advantages of this modern, time-saving, durable, introcellulose finish are more and more appreciated by architects, decorators and owners.

For complete information on lacquer and other architectural finishes, phone our Architectural Service Department—Victory 1800.

Pratt & Lambert Varnish Products

STAINS, FILLERS, VARNISHES AND ENAMELS

By R. W. LINDSAY, CHEMIST

Only a few decades ago varnish making bordered on an occult art. The formulas and rule-of-thumb methods used by different manufacturers were so zealously guarded that the interest of others did not reach back of the finished product. Then the chemist entered the field. He made an exhaustive study of the properties given to varnish and its allied products by the different materials entering into their manufacture. Thus equipped, he was able to make products exactly adapted to all of the increasing number of purposes for which finishing materials are used. This means that to-day the architect can find excellent materials for any finish that he may wish to secure; but this bewildering variety of materials also means that he must give more thought than ever before to his selection. Should I specify an acid stain or an oil stain? Why should I use varnish instead of shellac on floors? These are samples of the hundreds of questions that can be answered intelligently only when the solution is based upon a comprehensive, organized knowledge of the materials available. And for the one who will delve deeply enough, it is a study as fascinating as it is profitable.

In considering the above subject it will be necessary to divide this treatise into four distinct classes in accordance with the title.

Stains.

The subject of stains may be divided into four parts, as follows:

- 1st. Aniline Oil Stains
- 2nd. Aniline Spirit Stains
- 3rd. Pigment Oil Stains
- 4th. Acid Stains

By the aniline oil stain is meant a stain made by the solution of an aniline color in some solvent such as benzol, solvent naphtha, turpentine, benzine, or in other words, an oil solvent. Often in combination with these aniline colors is used a considerable amount of asphaltum varnish in order to obtain certain desired results. There has always been, and still is, a great deal of doubt in the minds of most users as to just what is meant by an aniline color and when we consider the great number of organic compounds known as aniline colors, it is not strange that such is the case. By an aniline color we mean one derived from the chemical compound aniline which is found in coal tar. Aniline is then treated with various acids and other chemicals and we are able to form new compounds and from these compounds still other compounds, and it is these various new compounds which are formed that are the aniline colors of commerce. These colors vary in their solubility according to their composition and consequently we have aniline colors soluble in oil, aniline colors soluble in alcohol, aniline colors soluble in water and in addition we have also many aniline colors, which we may say are "forced" in their solubility, i. e., the aniline color may be only slightly soluble in a solvent such as benzol, but when combined with a fatty substance such as stearic or oleic acid, which is soluble in benzol, is carried into solution in this way. This latter fact accounts as you may readily understand for the non-drying nature of many of the oil anilines. The aniline color itself may be a material which would be perfectly dry, but of course, is not permitted to become so on account of the presence of these non-drying fatty acids.

The aniline oil stains have very strong penetrating powers and carry the dye far

into the wood. They may be used on both hard and soft woods, both open and closed grains, but naturally better penetration is secured in the softer woods. These stains, being perfectly clear and containing no pigment, produce a beautiful, clear, transparent stain, usually rich in color and beautiful to look upon. This beauty is of course brought out by the application of shellac and varnish.

In finishing a panel with a stain of this nature we find that the stain works very easily, giving a remarkably uniform effect and apparently is an excellent product. Shellac is then applied and later the varnish and the brilliancy of the stain is very much enhanced. Supposing that we have a panel finished up in this way and the same is allowed to be set aside for some time and then later examined, we are very much surprised to find that, first, instead of having a stain rich in color that a great deal of its depth has disappeared and left in many cases, a muddy effect. At any rate the stain has faded very considerably. Secondly we notice that the varnish itself has died down very materially and that upon scratching the varnish film, we have instead of a firm, tough finish, a finish which looks very much as though it were made entirely of rosin. This latter effect is due entirely to what is termed "Bleeding" of the stain due to the following conditions: The stain as applied, was, as stated above, composed of aniline colors soluble in benzol, turpentine and other solvents of a similar nature and consequently upon application of the shellac over the stain, the alcohol penetrated into the pores and dissolved out a certain part of the stain and carried it into its own film. The varnish, then following, also having the power by means of its thinner, to dissolve this dye, picks up the color and carries it into its own film. These colors are extremely susceptible to this kind of an action and have been known to have carried sometimes through five or six coats of paint. There is one case, which has come to my attention, where there has been applied over a finish of this kind two coats of varnish and five coats of white enamel, yet after each successive coat of enamel has dried, the pinkish cast of the mahogany aniline stain has appeared and cannot be removed unless the entire finish down to the wood is taken off and the color itself removed. Naturally the layman in having his house finished and noticing the condition of his wood finish from time to time, detects the falling of the lustre of his varnish and immediately draws the conclusion that the varnish applied to his house is of an inferior quality and it is my presumption that the reputation of the varnish manufacturer has been harmed a great deal more than we realize by such conditions. Of course, many of the manufacturers of stains of this nature do produce what are called primers, which are supposed to take care of this "Bleeding" effect and no doubt these articles do retard the "Bleeding" very considerably, yet there are none which are absolutely free from this trouble.

In this same class of materials of a somewhat different construction, are the **spirit stains**. These, of course, are made by a solution of aniline colors in alcohol and only used to a very limited extent on account of the fact that they are extremely hard to work and apply evenly, it being almost impossible to apply a stain of this character on a large surface with any degree of even-



Union Carbide & Carbon Bldg.
Burnham Bros., Architects.
W. P. Nelson Co., Painting Contractors.

*Where Beauty
and Durability
are Essential
Features*

In the above project DU PONT placed Science back of their products, thus eliminating *doubt*—

WHEN YOU SPECIFY
DU PONT'S
PAINT PRODUCTS
paint products
YOU ARE NOT
GUESSING—
YOU KNOW

An Architectural Representative will personally assist you in your paint specification requirements at your request—Phone Brunswick 6900.

Architectural  *Finishes*

PAINTS, ENAMELS, VARNISHES AND DUCO

E. I. Du Pont De Nemours & Co., Inc.

2100 Elston Ave., Chicago

ness, and secondly, they are prone to work up into the shellac applied over them, so that it is almost an impossibility to get a good finish. They naturally "bleed" very considerably and have caused all kinds of trouble not only in this respect, but also in regard to their fading. Being used in such limited quantities as they are, it is not necessary to describe them further, but merely to state that they should be avoided.

The third type of stain mentioned above is what is termed **pigment stains**, and by this is meant one made by grinding of a pigment or pigments in oil, usually linseed oil, and its subsequent reduction with turpentine or some such vehicle sufficient to effect penetration. The pigments used in stains of this kind are:

Ochres
Siennas
Ambers
Chrome Yellows
Chrome Greens
Carbon Black
Prussian Blue
Para Reds, etc.

and as you can readily see, their staining effects must be really due to the lodgment of the pigment within the pores of the wood. In reality they are nothing but a thin paint sufficiently reduced so as to penetrate the pores of the wood. These stains do not give as clear an effect as the penetrating stains nor do they penetrate the wood so readily, and consequently are limited almost entirely to soft woods where a sufficiently deep penetration may be effected. However, even though these stains are not quite as clear as the previously discussed class of stains, yet they are sufficiently clear to produce some very beautiful effects and when we consider the fact that they are practically non-fading, have absolutely no tendency to "bleed" and that the after results are consequently very much more satisfactory than otherwise, we must concede that they are far superior to any stain in which the after-results are very questionable. Furthermore, these stains being made upon a linseed oil base, have a tendency to preserve the wood and consequently are of material assistance in this way.

The third class of stains mentioned above are the **acid stains**. The term acid, applied to most of these stains is a misnomer on account of the fact that nearly all of these stains of this class are practically neutral in their reactions, i. e., they are not made by the solution of acids in water as the same suggests but are made by the solution of various dyes in water or a medium miscible with water. These stains are perfectly clear solutions and when applied to the work, they work very easily under the brush and may be spread out over large areas with a degree of evenness. Having been applied, and the work finished, they are very permanent as regards fading and have little tendency to "bleed".

The reason for the latter effect is due to the fact that the dye used is a water soluble product and consequently even though the vehicle of the varnish applied over the stain may penetrate into the wood, yet the dye is not picked up and consequently does not "bleed" into the successive coats of varnish. This point may be very readily illustrated by carrying out the following experiment: A panel, for example, is finished at one end with coat of mahogany aniline oil stain and at the other with a coat of mahogany acid stain and a coat of shellac is applied over the entire panel, followed by a coat of white enamel. Allow this panel to stand for a short time and the result is, that within a very short period of time, it will be noticed that the enamel over the aniline oil stain is covered with reddish spots, showing the way in which the "bleeding" has taken place. The enamel over the acid

stain has not been affected, thus indicating the "non-bleeding" nature of this stain. These acid stains produce beautiful, clear, transparent effects, are permanent and "non-bleeding" and are really the ideal kind of stain, but like many other materials which are so nearly perfect, they have one defect. This defect is due to the fact that when the water is applied to wood, the grain is caused to raise very materially and it is the sanding down of this grain, which restricts somewhat the use of the acid stain. The acid stain is confined almost entirely to the use of hard woods on account of the fact that the softer woods necessitate a large amount of sanding. The best practice is, of course, to sponge off the wood first, sand and then apply the stain and follow with another light sanding. In this way, the maximum amount of stain is retained in the wood and the effect is not spoiled. Notwithstanding this defect, however, these stains are really the most practical, most lasting and produce the most satisfactory results.

FILLERS.

This class of materials may be divided into two parts:

Liquid Fillers.

Paste Fillers.

When Liquid Fillers were first placed on the market, they were offered as substitutes for shellac and at that time the material sold as such was of far better quality than most of the so called Liquid Fillers of today. Today, most of these goods are composed of nothing more than Gloss Oil, a little Linseed Oil and the cheapest Pigment it is possible to get. All kinds of pigments have been used but the most satisfactory are either asbestos or China Clay on account of the property these pigments have of remaining in suspension. Notwithstanding the fact however, that the general run of Liquid Fillers has deteriorated so much, a few of the best manufacturers are producing goods for this purpose which really have quality. These goods are necessarily made so that they dry very hard and firm, carry sufficient pigment so as to fill the pores to a certain extent and give a surface which is very non-absorbent and over which the varnish may be applied in such a way as to have a good full body and lustre. This class of materials is not recommended for use upon floors or for exterior purposes on account of its extremely hard nature, yet for certain purposes, it serves in a very favorable way, and may be recommended.

The second type of filler is the **PASTE FILLER** and by this product we mean one sold in paste form and made by mixing or grinding together of certain pigments, linseed oil and a Japan drier. The function of a paste wood filler is to close all the pores of the more or less open grained woods, so that, while the surface becomes non-absorbent, the natural beauty is not obscured, and if the wood is stained, the filler must not dull the transparency of the stain. Therefore, the more translucent the filling material, the more valuable the product. Consequently, while barytes, clay whiting and gypsum are still employed on account of their cheapness, the ideal material for a filler is siliceous or silica. Siliceous or silica is really powdered quartz, and is a pigment which is extremely transparent, has considerable "tooth," and consequently makes an ideal pigment for this purpose. A paste filler is generally made by merely mixing the silica and its vehicle, and is received by the consumer in paste form. This is reduced with turpentine, and is then ready for application. A good filler should be dry in twenty-four hours, and then sanded and dusted off, leaving a surface ready for the application of the material following.

Fillers are really materials to which suf-



Holabird & Root,
Architects.

Stevens Hotel.

W. P. Nelson Company,
Decorators.

The World's Largest Hotel Undercoated With Hockaday

The **WALL-MARK**
of Quality Hockaday insures the
walls of this hotel
against air checking,
suction and lime burning.

Architects and owners have been
specifying and using Hockaday

for twenty years. One coat is
protection against wall destroy-
ers; two coats in colors gives a
finished job.

Our service department is always
ready to help you solve your
painting problems.

HOCKADAY, Inc.

1823-31 Carroll Ave., Chicago



ficient attention has not been given, and it behooves the architect to see that he gets the most translucent fillers possible even though the same costs him a little more, this extra expense being do doubt explained very largely by the fact that the pigment used is more expensive. Furthermore, the best grade of fillers always contain a good grade of linseed oil and a good gum Japan, the latter serving to harden up and to make the filler non-absorbent. Here, again, the use of a cheap filler necessarily means the use of a material containing a cheap japan which will have the effect of reducing the durability and stability of the filler. Colored fillers for various modern effects are, of course, made up by incorporating certain colors with the regular paste filler and some very beautiful results may be obtained.

VARNISHES.

This subject should be divided into two parts, as follows:

Spirit Varnishes. Oil Varnishes.

After the wood has been properly filled, it is customary, both in architectural and industrial work, to apply a coat of spirit varnish. For many years practically no material was used for this purpose but shellac.

Gum shellac, as you are no doubt aware, comes to us very largely from India and is a resin produced by the vite or sting of certain insects on the small twigs of several species of East Indian trees. The resin appears to be formed from the plant sap by the female insect from whose body it exudes, ultimately burying the insect and her eggs and forming a thick excrescence on the twigs. This is collected, macerated with warm water to extract a dye and the residue (Seed Lac) is refined by melting and straining. It is then poured in thin films on wooden cylinders when it hardens and scales off in thin flakes and is then called "shellac."

Bleached shellac is made by passing a stream of chlorine gas into an alkaline solution of shellac. There are on the market a number of grades of shellac, due to the fact that during the melting process, rosin is added to facilitate the melting process. The result is that we have a great many products termed shellac which contain a very large proportion of rosin and many which contain absolutely no gum shellac.

Due to the extremely high cost of shellac there has come upon the market a large number of shellac substitutes and, as with all other varnishes, there are many which can be used with a high degree of satisfaction and many which are absolutely worthless. Most of the better grades of shellac are made by dissolving certain spirit copal gums in alcohol. On the other hand, there are a large number of shellac substitutes which are made on a rosin base or at least contain a large proportion of rosin so as to make a substitute which is satisfactory only from the standpoint of price.

To my mind, one of the most important points in an architect's specification is the question of the character of the spirit varnish which is applied over the filler; for the reason that, just as no house can be built with a foundation of sand, so no finish should be built up with a foundation coat which has no durability, is extremely brittle and has in fact no qualities to recommend it except that of cheapness. An architect in recommending a manufacturer's grade of substitute shellac has, of course, the assurance of the house manufacturing that goods that it will be satisfactory. On the other hand, as an architect specifies "shellac" and does not definitely specify as to the grade of shellac, he cannot be certain as to the results. It might be well to suggest that if an architect desires that shellac be used, he write a specification like that of the Government which compels the use of a shellac con-

taining no rosin nor other adulterants. With the extremely high cost of shellac at the present time, architects will find it well worth their time to consider shellac substitutes made by reputable manufacturers for work where it is not necessary to secure the very highest grade of finish.

We now come to the subject of Oil Varnishes, and in taking up this matter we will discuss the various materials used in varnish making and follow this with a brief description of the process itself.

Varnish has four main constituent parts.

First: The fossil resins, or gums, as they are termed, which give to the varnish its brilliancy and lustre and to a certain degree its durability.

Second: The drying oils which render the varnish elastic, durable and to a certain extent affect the lustre.

Third: The metallic driers which are incorporated with the oils to hasten the drying of the varnish film, acting as carriers of oxygen from the air to the drying oil.

Fourth: The volatile solvents which aid in the spreading of the varnish upon the work.

First we shall take up the various raw materials used in making varnish, and describe the source from which these various materials come, and then later, the way in which these materials are used in the actual varnish making process.

The first of the raw materials to be considered are the resins, which are divided into three classes. We first have the fossil resins, which are the exudation of trees which existed thousands of years ago, the sap having flowed from the trees to the ground where it was covered with decayed vegetation, etc., and fossilized. Second, we have the semi-fossil resins, which are the exudation of trees of more recent origin, and third, we have the crop resins, which are gathered directly from the tree, the tree being cut in such a way that the sap will flow and this sap is hardened by oxidation.

Zanzibar Animi is a fossil resin coming to us from Zanzibar on the eastern coast of Africa, and is characterized by the goose skin effect which we find upon the various pieces of gum. The gum is extremely hard, and was formerly used in the manufacture of our best grade of piano varnishes and interior varnishes. It was used in the piano varnishes on account of the fact that it makes an extremely hard varnish, and one which may be readily rubbed and polished. It was used in the spar varnishes on account of the fact that it made a varnish which was very durable. This resin is not used today on account of the fact that it is practically impossible for us to obtain sufficient quantities for use in a practical way.

The next resin is that of the Congo Copal, the term Copal being applied to the gum found upon the west coast of Africa, to differentiate between these and the ones found on the east coast of Africa, of which the Zanzibar is a type. The Congo Copal is very light in color, makes a varnish which dries with a good hard film, and is used in large quantities in high grade varnishes. For this reason it is used in high grade baking varnishes and interior varnishes where color is an essential feature.

The Benguela Copal is very similar to Congo, coming from the same general district on the west coast of Africa, but differs in that the varnishes made from this gum are darker. The Benguela is characterized by the greenish cast which is displayed throughout the various pieces of gum.

The Sierra Leone Copal is one of the most elastic resins known to the varnish maker. For this reason it has been used with wonderful success in the pale coach and car var-

*"Our Specification
of
Degraco Paints
has been
justified by RESULTS"*

—Walter W. Ahlschlager, Inc.



STIPLOID, the Washable Wall Paint, used throughout as foundation coat, and as finish coat on stair halls, locker rooms and service portions.

DEGRACO-TONE, the Velvet Finish Wall Paint, used on walls and ceilings of all guest rooms.



Medinah Athletic Club, Chicago

Walter W. Ahlschlager, Inc.
Architect

J. A. Torstenson & Co.
Painting Contractors

DEGRACO PAINTS
All Colors for All Purposes —

DETROIT GRAPHITE CO.

CHICAGO OFFICE

1644 MONADNOCK BLDG.

PHONE HARRISON 1014

nishes and in spar varnishes, where elasticity is the most essential feature. At the same time it makes a varnish which has a very light color, and for this reason it is also very suitable for pale baking varnishes and also for varnishes where elasticity is a most important factor. This resin comes to us also from the west coast of Africa, coming from the district of Sierra Leone.

The next class of resins is the Kauri, coming to us from an entirely different region—from New Zealand. Kauri is one of the most popular resins in the varnish industry on account of the fact that by it may be made a most durable varnish, and also a varnish which is excellent for rubbing and polishing purposes, due to the fact that when this resin is handled properly varnish may be made which has less tendency to "sweat out" in the process of rubbing than a varnish made with other gums. Furthermore, Kauri has very good durability, and is consequently used in the high grade exterior varnishes. Kauri comes to us in various grades, ranging greatly in physical characteristics and price. The better quality Kauri, for instance, costs at the present time \$.90 per pound. The No. 1 Kauri costs \$.50 per pound, while the Brown Kauri costs \$.15 per pound. The varnishes made with these various grades of Kauri have, of course, the same general properties, yet differ so considerably that it is most important that the grade of gum be considered very carefully in the manufacture of a varnish.

The Manila Copal is a type of the resins which are termed soft resins, and comes to us mostly through the port of Manila, being found largely in the East Indies. White Manila is used a great deal in the cheaper interior and medium priced varnish, and when handled properly some very good results can be obtained. However, it carries quite a large amount of free acid and has the property of causing a varnish to have a softer film than one made with the Kauri or the other harder gums. Manila, like Kauri, comes to us in various grades, the best being the White Manila and a cheaper grade being the Manila Nubs, which is a form very popular with the varnish manufacturers on account of the fact that the Manila Nubs, being small pieces, are much easier to handle than the White Manila, which comes in extremely large pieces. The Manila gum is derived from one of the most prolific gum-bearing trees known, and some of the pieces of gum which have been found are very large in size, being sometimes two or three feet in diameter.

The Damar resin is a gum which is probably very familiar, having been used for years in the manufacture of Damar varnish. Its one important feature is its color, and that is about all which we can say for it. It has no durability, is very soft, and a resin with a very low melting point, so that it cannot be used in any of our high grade varnishes. Damar resin has been used for a great many years for the manufacture of white enamels and for a considerable length of time all the white enamels on the market were made upon this base. Today, however, the highest grade of white enamels contain no Damar on account of the fact that it is lacking in durability. We still, however, have a great many cheaper, quicker drying, and less durable enamels, which are made upon a Damar base.

The Asphaltum is not really a resin, being a cross between soft coal and petroleum, and comes to us largely at the present time from Utah. This bituminous material is used in the manufacture of our black air drying and baking japans, being used largely upon iron work.

While the above does not describe all of the resins which are used by the varnish-maker, yet it gives an idea of the various

properties which the varnishmaker obtains by using the different grades and kinds of resins, and we shall now proceed to give a brief description of the various ways in which these resins are gathered. As mentioned above, these resins are formed by a fossilization of the sap, which came from trees, which existed thousands of years ago, and it is of particular interest that many of these resins are found as deep in the earth as twenty or more feet.

The gum digging industry in the early days, particularly in New Zealand, was for many years carried on in a desultory manner, with the result that practically no gum was procured except that which lay on the surface. The gum diggers in the olden days would start out in the morning with what they termed their prodding stick and knapsack on their backs and by the use of this stick would determine places where the gum could be found. They would proceed to dig up the gum and carry it with them until evening, when they would sit around their camp fires and scrape the gum and prepare it for the market. Today, however, the gum digger is more like our modern miner. He starts off with his various prospecting sticks, his spade and coarse tooth saw, with which he saws around the roots and moss in order to unearth the gum. The surface of the earth is then dug up and the gum and dirt thrown to one side. This digging goes on until at times we find diggers have proceeded to a depth of twenty feet below the surface of the earth in their search of gum. The gum is then thrown upon a screen, where it is washed and the earth and other decayed matter separated from it. The gum is then all scraped and sorted, and then carried down to a general warehouse, where it is further sorted and graded. The gum is then taken to the brokers' warehouse where it is further sorted by men who have wide experience in this line. These men start as mere boys, first working on the cheaper gums and then they are gradually promoted to work on the higher grades of gum. This is very important work when we realize the variations in its price. The gum is then put into bins, and from the bins is packed in cases, then shipped to foreign ports.

Gradually during the past few years synthetic resins have attained wide spread use due to their special affinity for China wood oil. The most outstanding synthetic resin and the one which has been used for the greatest length of time is Ester Gum, usually manufactured by chemically combining rosin and glycerine. In the course of the reaction the rosin and glycerine lose their identities and there results an entirely new substance of unique properties—a rosin ester gum.

Ester Gum dissolves readily in oil and thinner, produces a much lighter colored varnish than a fossil resin, is more water-proof but has not, of course, the ultimate hardness usually required for good rubbing and polishing properties.

Copal Esters made by combining Congo or one of the fossil resins with glycerine are used to a very limited degree.

Recently other synthetic resins of radically different nature have been developed and these newer resins are largely responsible for the so called four-hour varnishes and enamels which have recently made their appearance upon the market. These new synthetic resins are produced by the reaction under certain conditions of different chemical compounds of which carbollic acid and formaldehyde are the best known. These resins have the valuable property of causing rapid drying of the oil by producing an entirely new effect to which has been given the name "Jellation." This effect causes the varnish to set very quickly and dries on the surface very rapidly, although not hardening through at the corresponding rate.

MARSHALL FIELD GARDEN APARTMENT HOMES—

*Finished throughout
Interior and Exterior
with*

Benjamin Moore & Co.
Products

Andrew J. Thomas, Architect
O. W. Rosenthal-Cornell Co., Builders
J. Bernard Mullen, Painting Contractor

Use Moore Paint

Benjamin Moore & Co.

Paints, Varnishes and Muresco

NEW YORK
CHICAGO
CLEVELAND



ST. LOUIS
CARTERET
TORONTO

We now pass on from the subject of gums to that of oils, and the first oil we shall mention is, of course, Linseed Oil, which is made from the flaxseed grown in Canada, United States, Argentine, India, and around the Baltic Sea, and it is very curious to note that the oil from these various parts of the world should differ so much, due probably to climatic conditions and also to methods of harvesting.

The flax is cut in the field and the flaxseed is then separated from the flax stalk. This seed, in the case of that grown in our own country, is then carried to the various lake ports and comes down the lakes in large grain boats. The seed is then conveyed from the boats to the grain elevator, and is separated according to the various grades and the source from which it comes; it is then carried by means of large conveyors to the rolls. These consist of large steel corrugated rolls between which the seeds pass until they are entirely crushed into the form of a fine powder. This powder is then emptied into the tempering kettle on the floor below, where a certain amount of moisture and heat is applied by means of steam, the proper amount of moisture and the correct temperature being judged by the workman, who is very expert at this particular trade, gauging the temperature and moisture by the feel of the seed in his hand. When the powdered flaxseed is in proper condition the seed passes out under the "former" between two camelhair mats. It is then placed in the presses, the mats being one above the other and when the press is entirely set up a large hydraulic ram forces the mats together, pressing out the oil from the seed.

The material left in the press is the linseed oil cake, and all the surplus oil is found at the edge of the cake. The cake is consequently passed through a trimming machine, which takes off this edge and the cake is then baled up ready for shipment and the trimmings are sent back to go through the process once again. This cake is used largely for a cattle food, and the largest portion of it is shipped abroad to Belgium and Holland.

The oil is then filtered by filter presses, passing through filter cloths, and is now ready to be filled into the barrels. Thus we have our raw linseed oil. The oil at this point, however, is not in proper condition for use by the varnish maker on account of the fact that when heated to a temperature of about 450 degrees F., mucilaginous material, otherwise known as the "Break," separates from the oil. Consequently it is necessary that the linseed oil manufacturers further refine the oil, which is done by means of various chemicals and mechanical devices in order to produce an oil which will meet conditions imposed by their customers. At this point also the various driers are added to the oils in order to prepare the boiled oils found upon the market.

The next oil we shall consider is an oil which perhaps, is not quite so familiar as linseed oil, being our China Wood Oil, an oil made from the nuts of the Tung tree, a tree indigenous to China, growing largely in the interior of China, particularly along the banks of the Yangtse River. These trees bear fruit about the size of a small orange, each fruit containing five segments, each segment containing a kernel. The fruit is roasted over a fire, which breaks open the segments, the kernels separate and these kernels are then placed in the crushing machines.

The Chinese in the olden days used an extremely crude piece of apparatus for crushing these kernels, being nothing more or less than a large stone, which is rolled back

and forth in a trough and crushes the kernels. A more modern crusher consists of a large stone weighing several tons; this is drawn around within the circular trough by means of mules, horses or other animals, and the kernels as they are crushed, gradually move toward the center. It is a very primitive means of carrying out these processes, but it must be remembered that individual Chinamen carry out the process on their own farms and therefore, the machinery cannot be very complex. The powdered China Wood Oil nuts are then tempered and placed between bamboo mats, and heated over a kettle of boiling water until the powdered nuts have picked up sufficient moisture and the mats are then placed edge-wise in the large press. This press also is of primitive style, consisting of large mats, and a large wooden ram forces the logs between which the mats are set edge-wise together, pressing out the oil. The oil is then filtered through bamboo cloths, and is then carried down to the China Wood Oil broker in large baskets, the baskets being lined with a peculiarly oiled paper. Each Chinaman carries four baskets, two being suspended from two sticks swung across the shoulders; each basket of oil which is purchased is tested and its richness determined. The oil is then emptied into the tanks, and from these tanks is drawn off into the barrels, in which it is shipped to varnish manufacturers. China Wood Oil being very different from linseed oil, and in fact, from any of the other oils, we will mention three of its chief characteristic properties. China Wood Oil when allowed to dry by itself on glass, instead of drying with a clear, transparent film as does linseed oil, dries with a cloudy opaque film, very much resembling a piece of ground glass. Secondly, China Wood Oil when heated at a temperature of about 450 degrees F., instead of gradually thickening as does linseed oil, it almost instantly goes over to a solid jelly very much resembling soft rubber. Thirdly, China Wood oil when placed in a bottle and exposed to the light, even though the bottle is air-tight, will, by the actinic rays of the sun be converted to a lard like mass. This last property is very easily overcome by the heating of the oil. The gelatinizing of the oil is also very easily taken care of by proper treatment with various gums, etc. However, the most difficult feature to overcome is that of the "dry-flat," as the varnish maker terms it. This is due to a wrinkling of the varnish film, and I would add it has cost the varnish manufacturer a great deal of money, and they have spent a great deal of time in order to overcome this very serious drawback. However, after years of study the larger manufacturers understand this property thoroughly and have overcome it entirely.

You may ask with all these drawbacks, why it is that the varnish maker should care to use China Wood Oil at all. In the first place, China Wood oil has two important properties which are not found in linseed oil. A varnish made with China Wood Oil will be very much more waterproof than that made with Linseed Oil. In the second place, China Wood Oil has the property of causing the varnish to harden very much quicker than when Linseed Oil is used. These two properties make China Wood Oil a very important and essential feature in certain classes of varnishes. On the other hand Linseed Oil produces in a varnish greater elasticity fuller body and lustre, better flowing properties than can be obtained with China Wood Oil. In producing a varnish, it can readily be seen that it is necessary to utilize each of these oils according to the results desired in the varnish. If, for instance, we desire to produce a spar varnish which must needs have a maximum amount of elasticity in order to stand expansion and

For Beautiful Mount Vernon . . .



*Mount Vernon, George Washington's famous home,
painted with Outside Barreled Sunlight*

THE proud task of maintaining and enhancing the beauty of Mount Vernon is shared today by a distinctive painting finish—Outside Barreled Sunlight. Its extreme whiteness, its full gloss and beauty of finish are achievements resulting from twenty years' specialization in the manufacture of white paint exclusively.

. . . For Interiors at Northwestern

AND in many other fine institutions, office buildings, hotels and hospitals, Interior Barreled Sunlight is the choice for interior painting because it best combines durable beauty with lasting cleanliness and adequate light—a satin-smooth, non-porous finish that resists dirt and washes like tile! Readily tinted with oil colors, producing clear and lasting tints. Made in three finishes, Gloss, Semi-Gloss and Flat.



Buildings on the McKinlock Campus of Northwestern University of Chicago, use Barreled Sunlight both in the white and in tints

See our complete Catalog in "Sweet's"

U. S. GUTTA PERCHA PAINT CO.

12 Dudley Street

Providence, R. I.

CHICAGO OFFICE—659 Washington Boulevard

Barreled



Sunlight

contraction due to weather conditions, it is necessary for us to use the most elastic materials which we can possibly obtain, consequently Linseed Oil gives us for this purpose the best results. China Wood Oil, on the other hand, when used in a spar varnish attains its waterproof qualities very much quicker upon exposure, will retain a perfect film only for a short period of time after which the film deadens, cracks and makes an extremely poor surface for re-finishing. The Linseed Oil varnish on the other hand while it dries and hardens more slowly and possibly, if rained upon, before it has hardened, will turn white (this whiteness disappearing upon its drying out) yet, at the end of about six months, the film will have worn evenly, and the varnish will have retained a good portion of its lustre.

If we now desire to produce a floor varnish, we must bear in mind that the necessary requisites of a varnish of this kind are that it must be very tough, elastic, waterproof and hard drying. This last property meaning that it must not soften up in warm, humid weather. In designing a floor varnish, we must of course look to the China Wood Oil for our waterproofness and, to a considerable degree, our hard drying properties. At the same time, we must look to our Linseed Oil in order to obtain the maximum amount of elasticity in the varnish film. This latter property is one, which is extremely important and which really determines whether or not a varnish will wear down evenly or whether it will crack and chip. Most people do not realize the amount of stress caused by the impression of heels on a varnished floor, but upon considering this point, you can readily understand that it is necessary to have the maximum amount of elasticity in order to obtain the very best results. Thus, you can realize that in making a varnish for a definite purpose it is necessary to use those properties found in each of these oils in order to obtain a properly balanced product, and this only serves to emphasize the importance of specifying for definite kinds of work the varnish which has been especially designed for that purpose.

A word should be said here regarding the new quick drying varnish, the basic principle of which was discussed in connection with the subject of resins.

During the past year or two, good, bad and indifferent quick drying varnishes have appeared on the market. The same principle described above of properly balancing a product for a definite purpose applies equally well to this new type of varnish. Quick drying products of quality may be had but even in the best of these varnishes there will be found that the practical advantage of rapid drying is at least partially offset by the fact that these varnishes as a class have less body and a greater tendency to skin and gas check.

It must be said, however, that these varnishes have only made their appearance and undoubtedly great progress will be made in the perfection of quick drying varnishes based upon the use of synthetic resins.

We will next take up the subject of Turpentine which is made from the sap, that comes from our southern pine trees. These trees were formerly cut according to the "Box Method;" that is, a box was dug at the base of the tree and the bark then cut from its side. The sap flowed down the side of the tree, ran into the box and was emptied from the box into a basket, then into barrels in which it was carried to the still. Today, however, on account of the fact that this method shortens the life of the tree, undermines its resistance to storms and thus permits great losses, we have perfected what is known as the "Cup and Gutter System." That is, the sap runs down the

side of the tree into a gutter and then from the gutter into the cup, thus the tree is not wounded except on its side, and it is found that the production of sap is greatly increased as well as its quality improved. Furthermore, the trees last a great deal longer and there is not the danger of the entire destruction of forests by wind storm. The sap after being gathered from the tree is then taken to the still, where, a small amount of moisture having been added, it is heated in a large copper retort; the turpentine passes over as a vapor, through coils, is condensed and we have our gum spirits of turpentine. The residue left in the retort is rosin, which is subsequently strained, cooled and prepared for the market.

The material which I have just described is known to the trade as Gum Spirits of Turpentine and it may be well to mention the difference between this product and Wood Turpentine. Gum Spirits of Turpentine is, as I have described, made by the distillation of the sap of the pine tree, whereas, Wood Turpentine is made by the distillation of the wood itself usually utilizing for this purpose, the stumps of pine trees which have fallen. Both of these products are very similar in chemical constitution and in many cases can only be distinguished by their odor. It may be of interest to know that the American Society for Testing Materials in drawing up their specifications for turpentine have adopted a specification to which a high grade of Wood Turpentine can conform based upon the fact that the latter when conforming to this specification is equal in every way to the Gum Spirits. It is important, however, in permitting the use of Wood Turpentine to insist that it conform to such specifications as these, as there are upon the market many grades which have entirely different properties and which should, under no circumstances, be used.

Having discussed the various raw materials used in varnish making, we will now describe briefly the varnish making process.

The gum or resins usually in approximately one hundred-pound lots are placed in a copper kettle, which stands about three feet high and about two and one-half feet in diameter. The kettle is then rolled upon the fire, the gum melted and held there until a certain proportion of the gum has been distilled off. At this endpoint, which is determined by the varnish maker, the melt is drawn from the fire and the oil, which has been heating at an adjacent chimney and which had been previously prepared, is emptied into the kettle. The gum and oil are then thoroughly stirred together, the kettle being run back on the fire and the gum and oil heated until thoroughly amalgamated. This endpoint is also determined by the varnish maker, who has his own particular way of judging as to when the melt is finished and when the batch is completed. The kettle is then withdrawn from the fire and allowed to cool, when it is taken to the thinning room, where the turpentine or other thinners are added. The varnish is then pumped into coolers, where it is allowed to cool to a certain extent before passing to the filter presses, which take out all the dirt. This is done very carefully, in order to take out the most minute particles of dirt and the varnish is then pumped to the ageing tanks, where it is allowed to age for a certain period of time, according to the quality of the varnish.

The question of ageing a varnish is one which has been given a great deal of study, and it has been proven that the ageing of varnish does improve it very considerably, both as regards its brilliancy and durability. This is apparently due to the fact that the various constituents of the varnish gradually become more and more closely knit to-



Interior Decorations and Furnishings by W. P. Nelson Company

Your painting and decorating problems are solved when you consult our staff in regard to any work, whether decorating or furnishing Residences, Theatres, Churches, Hotels or Public Buildings. We are glad to give our advice and estimates on any work which you are contemplating. Our drapery department offers you all the latest designs and effects for Residences, Theatres and Hotels

W. P. NELSON COMPANY

Established 1856

N. J. NELSON, President

Phone Whitehall 5073

CHICAGO
153-159 W. Ohio St.

CLEVELAND
4408 Carnegie Ave.

PHILADELPHIA
703 Ranstead

NEW YORK
209-211 W. 33rd St.

gether, which results in the improvement of the varnish.

While the matter of ageing is one, which has, in many cases, been very much overdrawn, yet, at the same time all manufacturers of the highest grade varnishes, even at the cost of tying up their capital, deem it sufficiently important to age their varnishes from one month to twelve months according to the character, grade and composition of the varnish. The completion of the ageing process is determined by tests made upon the varnish itself. After the varnish has been properly aged, it is then pumped to the filling tanks, from which it is drawn into the can or package, which is then labelled, and we have our finished product ready for the market.

ENAMELS

431. In order to cover this subject fully, it will be necessary not only to consider the products that are termed "enamels," but also allied products such as enamel undercoatings, etc. We can, I believe, very logically divide this subject into two parts:

Architectural Enamels.

Industrial Enamels.

By Architectural Enamels are understood enamels and allied products which are used for the finishing of high grade work such as is generally found in private homes, etc.

By Industrial Enamels, we mean those products which are used for the finishing of wall work, etc., in factories and industrial buildings of all kinds.

We shall consider first the architectural enamels and at the start state that by an enamel we mean a product made by the combination of pigments and a varnish vehicle so as to form a product such that it may be used as a finishing coat. The American Society for Testing Materials defines an enamel as a special form of paint, which, when spread in a thin film, flows out to a smooth coat and dries to a smooth, glossy, relatively hard, permanent, solid when exposed to the air. An enamel always contains pigment and has considerable hiding power and color. Some enamels dry to a flat or eggshell finish instead of a gloss finish. Generally speaking, we would consider the difference between an enamel and a paint that the enamel is made by the combination of pigment and varnish, whereas the paint is made by the combination of pigment and oils, although there may be drawn, of course, many exceptions to this definition.

Generally speaking, in all cases the method of manufacture is the same—the proper pigments having been selected, they are ground in a varnish vehicle to form a heavy paste. This heavy paste is then reduced with sufficient varnish to make the enamel workable or, in case of eggshell enamels, may be reduced with varnish and additional thinner, or in the case of flat enamels, may be reduced with a thinner such as turpentine or turpentine substitute.

We will not endeavor to describe completely the various pigments which are used in enamels. However, we will say briefly a little as to the principal pigments which are used in white enamels. In all the highest grade architectural enamels, especially those of the gloss and most of the eggshell, the principal pigment is zinc oxide. Zinc oxide is a pigment which comes on the market in various grades, although on high grade enamels, only the Green or the White Seal are considered suitable as pigments for the reason that other grades have not the pure white color which is necessary. Zinc oxide is an ideal enamel pigment for the reason that it is very light in weight and consequently stays well in suspension. Furthermore, it is an active pigment, combining

with the varnish vehicle to form a coat which will have a good lustre and furthermore, on account of its chemical activity, an enamel may be produced which has wonderfully good covering properties. On account of the chemical activity of zinc oxide it is necessary to use a great deal of care in the selection of the varnish vehicle for the reason that when zinc oxide is combined with many varnishes, particularly those with a china wood oil base, the enamel will thicken up and become unsuited for use.

Lithopone is a pigment which is being used today in some enamels, although not in the highest grade enamels, for the reason that it has remarkably good covering properties, has good color and is an excellent pigment. However, it does not tend to combine with the varnish vehicle in such a way as to produce the lustre found in a zinc oxide enamel. It rather has a tendency to dull down the lustre of the enamel, and on account of this tendency has been used very largely in eggshell and flat enamels. Furthermore, considerable difficulty has always been experienced with lithopone in that it has a radical tendency to turn gray in the sunlight, a reaction due to the actinic rays of the sun.

Many other pigments such as Whiting, Asbestine, China Clay, Silica, etc., are being used in many of the flat enamels and flat whites as they are termed, all being comparatively inert and used on account of their price in many cases to cheapen the product, whereas other manufacturers use them for different scientific reasons.

Many manufacturers use Asbestine on account of the fact that it helps suspend the pigment, although any quantity of this material in a paint will hinder the flowing. Other manufacturers use Silica on account of the fact that it assists in the flowing, and where a considerable quantity of zinc is used does increase the durability and the tenacity of the material. Whiting is used many times to increase the flowing properties of a paint and China Clay is also used for this reason, and in order to improve the working properties of the product.

An enamel product should be judged more by what it does than by its composition, for manufacturers are learning today that many of the pigments which were held as adulterants a few years ago really have good reason for being in high grade enamel and enamel products and the architect in specifying enamel will do far better to consider the service that an enamel will give rather than its actual composition.

Eggshell and flat enamels are usually manufactured by using a sufficient quantity of pigment so that the pigment predominates over the varnish vehicle in such a way that the pigment comes to the surface, so to speak, and gives the semi-gloss or dull effect. Other eggshell and flat enamels are produced by the use of a vehicle such that it in itself has a tendency to dry out with a semi-gloss finish, which process does not necessitate the use of so much pigment and is really a more reliable product.

The subject of Undercoatings for use with enamels is one which is really covered by the subject of flat enamels in that an enamel carrying a large amount of pigment and having as good flowing properties as is possible, drying out either flat or with a slight sheen and manufactured in exactly the same way as is described above under the subject of flat enamels, is what is termed undercoating.

However, for architectural work, two kinds of undercoating are generally marketed—a regular enamel undercoating such as would be used on wood surfaces and an undercoating designed especially for use on cement, brick, etc., where it is necessary to use a special undercoating to resist the alkali in cement. Undercoatings of the former type



Bankers Building, D. H. Burnham & Co., Architects. Dilks Construction Co., Builders.

Painted and Decorated by
ALFRED OLSON COMPANY
Painters, Decorators and Wood Finishers

Contracts Taken Any Part of United States

4651 N. CLARK STREET

Long Beach 0766

CHICAGO UNION STATION

John Griffiths & Son Co., Builders
 Graham, Anderson, Probst and White, Architects

MORRISON HOTEL, SECTION 3

John Griffiths & Son Co., Builders
 Holabird and Roche, Architects

BUILDERS BUILDING

John Griffiths & Son Co., Builders
 Graham, Anderson, Probst and White, Architects
16 STORY SENECA HOTEL
 Paschen Bros., Builders
 Robt. S. De Golyer, Architect
CINCINNATI MASONIC TEMPLE
 Ferro Concrete Const. Co., Builders
 Harry Hake, Architect

are usually made on a lithopone base, whereas undercoatings for use on cement should be made on a zinc base, for zinc combined with a varnish vehicle produces a material which is very resistant to the alkali.

In undercoatings as in enamels the architect should, to my mind, refrain from specifying the composition of the material, but specify as to what the material shall accomplish.

We should at least mention the new quick drying four hour enamels which undoubtedly will be used and specified more and more by architects, particularly, in the colors. These enamels are manufactured upon the same general principle as the enamels described above but the vehicle is a varnish manufactured by the use of a synthetic resin and, consequently, imparts very quick drying.

Up to date it has not been possible to produce a white enamel of the same degree of whiteness as the long oil type enamel, but undoubtedly progress will be made along this line. These quick drying enamels do not have quite the fullness of body of the straight oil type, but their quicker drying coupled with sufficient durability for all practical purposes will undoubtedly make them very acceptable to the painting fraternity.

Passing from the subject of Architectural Enamel, we wish to say a few words on Industrial Enamel, or what are commonly termed "mill whites."

These products are usually of three kinds:

Gloss.
Eggshell.
Flat.

The flat is used as an undercoating with the gloss and eggshell. In all three of these

materials, lithopone is usually used as the basic pigment. The predominating feature in these products is the permanency of the white. That is, the ideal is a mill white which does not turn yellow upon standing, generally speaking, these products are not made with the same degree of care as architectural enamels. In many cases the grinding is not done as carefully and the lustre of the gloss enamel is seldom as high or as permanent as with the architectural enamel.

A very important feature with an industrial enamel is its working properties.

On account of the high cost of labor, usually only two coats are recommended for industrial work, although it is an established fact that far better work would be secured if three coats were used, so as to enable the use of a primer, especially on new work. However, practice has established that two coats is sufficient and two coats are generally specified.

One exception to this is the finishing of new concrete and cement where it is absolutely necessary for a special coating to be applied as a primer before the undercoating and enamel, if work of a permanent nature is to be secured, for the reason that otherwise, free alkali will attack violently the mill white and cause disintegration and discoloration in a very short time.

The above does not treat in any great detail of these various products, but we trust it will be of assistance to architects in making specifications, and in concluding I wish to particularly call their attention again to the fact that in specifying an architect should look to the service which a product gives rather than to the actual chemical analysis.



Passavant Hospital

Holabird & Root, Architects; Geo. A. Fuller Co., Contractors

Painting and decorating of above building by the

J. B. NOELLE COMPANY

Painting Finishing Decorating



868 N. Franklin Street, CHICAGO

Superior 1964-1965

PROTECTIVE, PRESERVATIVE AND DECORATIVE COVERINGS

File Brush Using Trade.

STANDARD PAINTERS' MATERIALS.

An attempt is made in the following to define those materials which may be readily prepared by any competent painter, that are generally accepted as standard for high grade work. Such materials very properly form the basis of comparison for all proprietary paints. No proprietary preparation should be accepted for use that does not equal in enduring, wearing quality, appearance, cost and ground for subsequent coats, the materials hereinafter described.

Classification of preservative and decorative coverings is commonly made according to the nature of the surfaces which these materials are designed to cover.

Materials for painters' work are divided according to their nature under the following headings: Pigments, Binders and Agents or Solvents.

Paint consists of a binder or binders and a pigment or pigments incorporated or mixed together. Mixing of paint ingredients is accomplished in a manner either by stirring or grinding together by hand or by machinery. Machinery mixing with proper apparatus is most certain to secure uniformity of result, and is therefore advised where practical. It is practically impossible to get a perfectly smooth paint by hand mixing.

Linseed Oil is the only known universally successful binder for paint and the holding power of the paint depends almost entirely on the strength of the linseed oil used. This oil is adulterated in many ways, but the most common is with mineral oil. The manufacturers of mineral oil substitute have perfected their product to such an extent that it is difficult to distinguish it from the real article except by chemical test or actual use, when its inferiority is quickly manifest.

STANDARD BINDERS.

Raw Linseed Oil is the oil obtained from seeds of the Flax-plant, *Linum Usitatissimum*, and what is known as commercially, pure grade, has a specific gravity of not less than .932 nor in excess of .936, when the temperature is 15½° Centigrade, or at temperature 25° Centigrade, not less than .927 or more than .931. It has a minimum Acid number 6, Saponification number minimum 189, maximum 195. Unsaponifiable matter maximum 1.50%. Refractive index at 25° Centigrade minimum 1.4790 to maximum 1.4805. Iodine number (Hanus) 170. It is a straw yellow in color, weighs approximately 7½ lbs. to the gallon.

Boiled Linseed Oil, commercially pure, consists of raw linseed oil as above defined, kettle boiled at a temperature not to exceed 500 deg. Fah. nor less than 300 deg. Fah.; or the same sort of oil prepared with best pure Japan dryers, so as to increase drying qualities. If salts of lead or manganese are thoroughly incorporated into the raw oil, very similar results are produced to the boiling process. An old method of increasing the drying properties of linseed oil was to heat the oil to near the temperature at which it undergoes destructive distillation (550 deg. Fah. or thereabouts), and stir in at the same time, oxide of lead or oxide of manganese, or both. Such method, however, darkens the oil very much.

The U. S. Army Standard Specification for Boiled Linseed Oil Is as Follows:

Specification W. D. 2.

It shall be absolutely pure, well-settled linseed oil boiled with oxides of manganese

and lead. It shall conform to the following requirements:

	Max.	Min.
Specific grav. at 15.5°/15.5°C.—	0.945	0.937
Acid number	8.000	....
Saponification number	195.000	189.000
Unsaponifiable matter, pct....	1.500	....
Refractive index at 25° C....	1.484	1.479
Iodine number (Hanus).....	....	168.000
Ash, per cent.....	0.700	0.200
Manganese, per cent.....	....	0.03
Lead, per cent.....	....	0.1

STANDARD SOLVENTS.

Spirits of Turpentine, chemically pure, is composed of a volatile oil obtained by the distillation of turpentine oil obtained by tapping or boxing yellow pine trees. It is a clear, colorless liquid, with a pleasant, pungent odor and shows a very slight residue when evaporated. Spread over any surface in a thin layer, it will dry in twenty-four hours, leaving practically no residue. Turpentine weighs about 7 lbs. to the gallon of bulk.

The U. S. Army Standard Specification for Turpentine Is as Follows:

Specification W. D. 3.

This specification applies both to the turpentine that is distilled from pine oleoresins, and commonly known as gum turpentine or spirits turpentine, and to the turpentine commonly known as wood turpentine that is obtained from resinous wood, whether by extraction with volatile solvents, by steam, or by destructive distillation. The bidder should state whether gum spirits or wood turpentine is furnished.

The turpentine shall be clear and free from suspended matter and water. The color shall be water white. The specific gravity shall not be less than 0.860 or more than 0.875 at 15.5° C. The refractive index shall not be less than 1.463 or more than 1.478 at 15.5° C. The initial boiling point shall be not less than 150° C. nor more than 160° C. Ninety per cent of the turpentine shall distill below 170° C. The polymerization residue shall not exceed 2 per cent and its refractive index at 15.5° C. shall not be less than 1.500.

STANDARD PIGMENTS.

Red Lead, practically pure from a commercial standpoint, is equal to 98 per cent lead tetroxide; but to secure this degree of purity, without a trace of soda or nitrate salts, requires a special method of reduction not employed by all manufacturers. In fact it has only been within the last few years that even the best manufacturers have been able to produce a pure red lead without having present from .1 to .5 per cent of soda or nitrate salts, which salts have a strong tendency to promote rust. Paint is intended as a protection of metal against rust, and as such should not contain any elements of a rust inducing nature. Specification should therefore require that red lead must be wholly free from soda or nitrate salts. The process now used to get red lead which is 98 per cent true, is by burning the lower grade red lead, 85 per cent true, for about 20 to 24 hours longer. This brings the true red lead, Pb₃O₄ up to the high standard which has lately been accepted as most effective in preventing rust. The American Society of Testing materials after exhaustive tests conducted within the last nine years have concluded

that the highest grade red lead, 98 per cent true, is even more lasting in character than the red lead which was formerly considered best for paint pigment which was about 83 per cent true red lead Pb_3O_4 (tetroxide of lead) plus 17% litharge PbO (monoxide of lead). The Government specifications have been raised from 85 per cent to 90 per cent true, and lately have been increased to 95 per cent of true red lead. (This observation does not apply to the war department which still follows the old standard).

This, therefore, argues very strongly for the 98 per cent true red lead, but it still remains a fact that very enduring paint can be made in compliance with the following formula: Pb_3O_4 (tetroxide of lead), 85 per cent plus litharge PbO (monoxide of lead) 15 per cent. Owing to the tendency of this combination of red lead and litharge pigment to unite with linseed oil in chemical combination, paint composed of red lead and linseed oil should not be prepared to exceed twenty-four hours before using. For if this combination of red lead and litharge is mixed with linseed oil and sealed up in an air-tight can, it will be found after a time that the mixture has solidified showing that the oxygen of the air which is the hardening agent in ordinary paints is not necessary. The chemical combination that thus takes place between the litharge and the oil in this mixture probably gives an increased toughness and endurance to paint applied according to this formula, provided this chemical action takes place after the paint is applied. Practically, it is very difficult to secure intelligence in the application of paint to structural portions of a building and it is therefore doubtful practice to use so large a percentage of litharge, not because it will not make a strong enduring paint, but because it is extremely difficult to get same applied before chemical action takes place. It has been found also that the addition of say 10 per cent of a practically inert pigment such as Princess mineral or oxide of zinc, increases the wearing quality of red-lead paint without other injurious effect.

The U. S. Army Standard Specification for Reinforced Red Lead Paint Is as Follows:

Specification W. D. 40.

Pigment 64 per cent.

Liquid 36 per cent.

The pigment portion shall consist of Red Lead (not less than) 60 per cent, the balance to be Silicious Matter, such as Aluminum Silicate, Magnesium Silicate, Silica or a mixture thereof.

The Red Lead used shall contain not less than 85 per cent Pb_3O_4 , the balance to be PbO .

The liquid portion shall consist of—

Pure Raw Linseed Oil (not less than) 90 per cent, the balance to be combined Drier and Thinner. The thinner shall be Turpentine.

Special Requirements: The paint must weigh not less than 16 pounds per gallon. It is intended to be used for a Priming Coat on Steel and when applied to smooth iron surface, it shall dry in 12 hours without running, streaking or sagging.

Corroded Lead, Basic Lead Carbonate—chemically to $PbCO_3 \cdot Pb(OH)_2$ is the form of lead pigment which has been in most general use for many years past. A satisfactory formula for white lead pigment is 70 per cent to 75 per cent of lead carbonate to 25 to 30 per cent of lead hydrate; this is in substantial compliance with U. S. Government standard specifications. While Basic Lead Carbonate is more poisonous than sublimed lead it still is a perfectly safe pigment to use with proper precautions. In fact nearly all paint pigments are more or less poisonous and care should be taken by painter to avoid allowing paint to come in contact with the skin.

Sublimed Lead or Basic Lead Sulphate—chemically to $PbSO_4 \cdot PbO$ is coming into gen-

eral use for paints and is practically non-poisonous and is just as valuable as a pigment for many purposes as the older form. It is particularly satisfactory as a base for tinting colors.

The U. S. Army Standard Specification for White Lead Basic Sulphate Is as Follows:

Specification W. D. 49.

The dry pigment shall be of the best quality, amorphous in structure, and of great opacity.

It shall contain:

Not more than 0.5 per cent Moisture.

Not more than 8.5 per cent Zinc Oxide (ZnO).

Not more than .075 per cent Sulphur Dioxide (SO_2), and

Not less than 12. per cent Lead Oxide (PbO).

Unless otherwise specified, this Basic Sulphate-White Lead shall be delivered in paste form, finely ground in pure, clear Raw or Refined Linseed Oil in the proportion of:

90 pounds Pigment.

10 pounds Oil.

White Lead Paste averages to contain by weight 92 per cent dry lead pigment and 8 per cent linseed oil and weighs about 38.1266 lbs. to the gallon of bulk.

Zinc White is oxide of zinc made by burning zinc in air. It is whiter than White lead but is not so opaque, and more coats of zinc paint are necessary to get a given effect over a dark background than of white lead. Paint consisting of commercially pure zinc white and linseed oil makes a strong and enduring wearing surface but does not produce as satisfactory ground for repainting after a period of service, as paint composed of a white lead pigment and linseed oil.

Combination Paint composed of an admixture of right proportions of White Lead and Zinc White with Linseed Oil will undoubtedly give better service than either White Lead and Oil or Zinc White and Oil alone, possibly for the same reason that two or more sizes of aggregate rightly proportioned make a better concrete with a lesser amount of cement than aggregate of only one size.

Graphite, or plumbago, may be said to be diamond plus heat; for if a diamond is heated to a very high temperature, without access to the air, it swells up and is converted into a black mass exactly resembling graphite in every particular. This theory being further verified by the fact that this change takes place without the loss or increase of weight. Graphite is found in nature in large quantities. It is sometimes found crystallized, but in a form different from diamond. Graphite can be prepared artificially by dissolving charcoal in molten iron; from such a solution graphite is deposited on cooling. Pure graphite is dark grayish-black in color and of a metallic luster. It is quite soft, leaving a leaden-gray mark on paper when drawn across same. It is used in the manufacture of the so-called lead pencil and is sometimes called black-lead. Such designation is wholly misleading, as it is in no sense metallic lead. Graphite is pure carbon, the element which is the principal constituent of all organic matter, both vegetable and animal. It is extensively used as a paint pigment, particularly for metal coating. Finely ground amorphous or non-crystallized graphite, when mixed with linseed oil, forms a perfectly inert pigment when united in mechanical mixture with the oil and without the slightest evidence of chemical combination. For this reason prepared graphite-paint is not injured by age as is the case with oil-paints, which are composed of oil and a pigment which will form a more or less stable chemical union with same. It is contended, by advocates of Graphite paint, that the inert nature of Graphite pigment contributes to the ease of its application and adds to its covering capacity and elasticity, making a better appear-

ing mechanical job with less labor and also a covering which can accommodate itself to the contraction and expansion of the material covered without serious injury to its efficacy as a protective covering. The non-active nature of graphite pigment makes it possible to coat surfaces with a much thinner coating than with the paint containing a pigment which acts chemically with its oil.

Lamp Black is a very finely divided form of charcoal produced by the deposit on cold surfaces of the imperfectly combusted products from burning oil. Lamp black may be said to be the soot produced by burning oil without sufficient oxygen present to form perfect combustion. This soot is largely made up of fine particles of carbon. Lamp black is used in the manufacture of ink and as a pigment for paint to be applied to metal. Many of the best contracting painters insist that lamp black ground and mixed with linseed oil forms the most enduring and attractive appearing paint for ornamental iron.

Paint for metal, first coat, should not be applied until after the surface is thoroughly cleaned free from dirt or grease, as such material keeps the coating from coming in contact with the metal, so that it cannot adhere to same. It might be supposed that grease would be absorbed by paint or varnish but this does not prove true in practice. To mix such materials would require their thorough agitation together. This is prevented in the application over dirty surfaces due to the fact that the grease is always mixed with and covered by an adherent film of dirt, which interferes with the action of the paint or varnish upon it; consequently making a loose film which will not permanently support the paint coating.

Colors are produced by mixing the various color pigments with the standard base pigments of lead or zinc.

The addition of Tinting Colors to White paint generally greatly increases the durability of the paint. The volume of base pigment needs to be reduced in proportion to the amount of color pigment added, so as to maintain the same relative relation of pigment to oil in the various coats as hereinafter prescribed. The scope of this article does not permit a discussion of the composition and merits of the numerous commercial color-pigments offered to the trade.

Chemical action between the pigments and oil in paint ordinarily does not occur, but there are exceptions. Sabin states that such action takes place with White Lead and Linseed Oil, "probably between the oil and the lead hydrate, which constitutes at least a quarter of the pigment." "This change is said to be due to resinification of the oil converting it into a sort of varnish." "Zinc Oxide (White Zinc) also acts on oil, but in a much less degree." "Paint consisting of White Lead and White Zinc mixed together in the proportions of two of lead to one of zinc is reputed to be superior to either alone. Zinc brushes more readily and is said to have a spreading capacity of 50 per cent greater than a straight lead and oil paint.

Paint Proportions and Covering Capacity.

Primer of Lead and Oil for new work should be proportioned by bulk, so as to contain 27 per cent of White Lead Paste, 62 per cent of Linseed Oil and 11 per cent of Turpentine.

Priming Lead and Oil will require 10.3 lbs. White Lead, .62 gal. Linseed Oil and .11 gal. Turpentine to make one gal. of paint.

One Gallon Lead and Oil Primer will average to properly cover about 2¼ squares of new wood work or 1¼ squares of common brick work.

One Square of New Wood Work requires to properly prime same with lead and oil 3¼ lbs. White Lead, .23 gal. Linseed Oil and .04 gal. Turpentine, or if common brick requires 8.24 lbs. White Lead, .5 gal. Linseed Oil and .085 gal. Turpentine.

Succeeding Coats of Lead and Oil Paint after primer should be apportioned by bulk so as to contain 30 per cent White Lead, 64 per cent Linseed Oil and 6 per cent of Turpentine.

Succeeding Coats of Lead and Oil Paint after priming will require 11.44 lbs. White Lead Paste, .64 gal. Linseed Oil and .06 gal. of Turpentine to the gal.

One Gallon Lead and Oil Succeeding Coater will average to properly cover, any coat, about 4½ squares of wood work after same has been primed, or 3 squares of common brick work, second coat. Third coat on brick work, one gal. will cover as much surface as on wood.

One Square of Any Oil Succeeding Coat on wood work after same has been primed will average to require to properly cover same 2.54 lbs. White Lead, .14 gal. Linseed Oil and .0133 gal. of Turpentine; or for 2nd coat on common brick work, 3.48 lbs. White Lead, .21 gal. Linseed Oil and .02 gal. of Turpentine. Third coat on brick work will require the same amount of paint to unit of surface as "Succeeding Coats" on wood.

Primer for metal of red lead to give satisfactory results can be made by mixing 23 lbs. of dry "red lead for painting metal" to 1 lb. of "zinc white," adding sufficient commercially pure "raw linseed oil" to make a gallon of the mixture, and thoroughly incorporating together. The mixing of the oil and pigment should only be as required at the work, never to exceed 24 hours before applying. The paint resulting will be rather stiff and requires thorough and careful brush work to make the surface elastic, and the material cover proper area. This paint should not be thinned by addition of evaporant liquids as these have a tendency to produce destructive chemical action on the paint, effecting its permanency as a protective coating.

Succeeding coats on metal, after primer, can very satisfactorily be of white lead and oil or zinc paints as above described, or a combination of the two.

Primer for masonry surface which has a strong alkaline reaction, such as plastered walls, brick masonry and concrete, should consist of a solution of zinc sulphate crystals dissolved in water, in the proportion of 3 lbs. to the gallon, after which succeeding coats of paint as defined above for wood work may be applied with satisfactory results. Oil paint should never be applied direct to masonry. There are a number of proprietary mixtures that are prepared especially for this purpose and which give excellent results.

Cheap Practical Substitute Oil Paint for more or less temporary use is illustrated by the U. S. Government War Department "Exterior Cantonment Paint" Standard Specification, which is as follows:

"W. D. 19"

This Paint also to be furnished in white when required.

Pigment 64%.

Liquid 36%.

The pigment portion shall consist of—
White Lead (Basic Carbonate, Basic Sulphate, or a mixture thereof).....42%
Zinc Oxide33%
Aluminum Silicate, Magnesium Silicate, or a mixture thereof, combined with the necessary pure tinting colors to produce the desired shade (a total of)25%

The liquid portion shall consist of—
Pure Raw Linseed Oil.....20%
Menhaden Oil, * Soya Bean Oil, ** or a mixture thereof.....40%
The balance to be combined Drier and Volatile Mineral Spirits.

Special Requirements: This paint shall weigh not less than 15 pounds per gallon, and shall dry within 12 hours, and leave a surface suitable to recoat in 36 hours.

The above name and standard specifica-

tion applies wherever similar type of paint is to be used.

*The Menhaden Oil used in this paint shall be pure, refined, light in color, and not of objectionable odor. It shall have the following chemical constants:

Specific gravity.....92-93
Iodine number, not less than..... 166
Saponification number, not less than 186
Acid number, not more than..... 8

**The Soya Bean Oil used in this paint shall be pure, light in color, and shall have the following chemical constants.

Specific gravity.....92-93
Iodine number, not less than..... 130
Saponification number, not less than 180
Acid number, not more than..... 4

Flat Finish Interior Paint

The most satisfactory Flat Wall Paints are made with Lithopone as the principal ingredient in the pigment. Lithopone is a wonderful pigment for interior use. It has great hiding power and spreading capacity and when properly mixed with the right kind of liquids makes the ideal inside flat wall paint. There are many standard brands of flat wall paints on the market that are worthy of consideration and use.

Fire Retardant Paint U. S. Army Standard. W. D. 21.

In any Tint desired.

For Exterior Use on Lumber Construction
Wherever Fire Resistance is Desired.
Specification.

White Paint and Tinted Paints made on a White Base.
Pigment 60%.
Liquid 40%.

The pigment portion shall consist of—
Basic Sulphate White Lead.....28%
Zinc Oxide.....22%
Magnesium Silicate, combined with the necessary pure tinting colors to produce the desired shade (a total of)....50%
The liquid portion shall consist of—
Pure Raw Linseed Oil (not less than)—55%
The balance to consist of equal parts of Drier, Turpentine and Volatile Mineral Spirits.

Special Requirements. This paint shall weigh not less than 13 pounds per gallon. When applied to new lumber construction it shall penetrate and dry rapidly to a durable film. It shall successfully withstand the standard firebrand test when applied to two-coat work.

The above named and standard specification applies wherever Fire Retardant Paint is to be used.

WOOD FINISHING MATERIAL.

Orange Shellac Varnish U. S. Army Standard W. D. 31.

Specification.

This material shall consist of 4½ pounds of Shellac cut in one gallon of Clear Neutral Denatured Alcohol.*

The Shellac used shall be a high grade Orange Shellac which, when treated with hot 95 per cent Alcohol, will not show a residue of insoluble matter exceeding 1.75 per cent.

The Shellac shall be free from Rosin and other adulterants.

The above standard specification applies wherever Orange Shellac Varnish is used.

*The alcohol used shall be No. 1 Internal Revenue Dept. Standard consisting of 100 gallons of grain alcohol and 5 gallons approved wood alcohol.

LIQUID WOOD FILLER.

U. S. Army Standard W. D. 52.

Specification.

Pigment 17%.
Liquid 83%.

The pigment portion shall consist of—

Finely divided Silica that will pass through a 200 mesh screen.

The liquid portion shall consist of—
Varnish77%
The balance to be Turpentine or Volatile Mineral Spirits, or a mixture thereof.

Special Requirements. When applied to wood it shall dry in not more than 5 hours. It shall be of the proper consistency for either brushing or dipping.

The above standard specification applies wherever Wood Filler is to be used.

Generally speaking, there is no great demand for a liquid wood filler. A thin coat of shellac or a varnish thinned with turpentine are recommended for use in place of liquid fillers.

Paste Filler for open grained hard-wood finish or floors requires for proper filling and wiping 1½ lbs. Silux paste and .14 gal. thinner to the square. Paste Filler is tinted or left transparent according to the color effect desired. One pound of prepared paste filler will fill 40 square feet of surface.

Wiping of paste filler is done with burlap, sea moss or excelsior and should always be done across the grain of the wood as if rubbed with the grain of the wood there is a tendency to lift the filler out of the pores of the wood and waste same, requiring more filler to give satisfactory results.

Thinner for paste filler may be either Turpentine or Benzine if the filler is of best quality of rock quartz, water floated, very finely bolted and mixed with special Japans and Linseed Oil, benzine seems to give the most satisfactory results for a thinner owing to its quicker evaporation. For the cheaper fillers Turpentine must be used.

Varnish is discussed in another article in this book so is omitted here.

Stains for wood work usually form one coat in addition to filler and coats of varnish or wax; these are of three kinds, oil-stain, spirit-stain and water-stain, and are used according to the effect desired.

Oil-Stain averages to require about .16 gal. to the square.

Spirit-Stain averages to require about .16 gal. to the square.

Water-Stain averages to require about .2 gal. to the square.

Prepared Wax averages to require about .33 lbs. to the square.

Gloss Oil is a term used to designate a preparation composed of resin and naphtha. This is a very cheap substitute for varnish often used as a size for plastered walls preparatory to tinting. It is a very inferior material and when used as a size softens and roughs with repeated washings. It is ruinous when used as a varnish or as a binder for paint.

Varnish, Best Light Interior, requires for properly coating one square, 1st coat over filler, 1-5 to 1-7 gal.

Varnish, Cheap, Thick Rosin, requires for coating one square one gloss coat, ¼ to ½ gal.

Cresote Stain required to dip ¾ length one M. shingles equals about 2¾ gal.

Cresote Stain required to brush coat one square shingles equals one gal.

Size for plastered walls preparatory to tinting should be varied according to the nature of the treatment to be applied over same and also with reference to the surface on which it is applied. A very good size for this purpose on smooth plastered walls is a coat of medium grade varnish. Such a size would cost about \$2.25 per gallon. A standard medium cost size for smooth plastered walls is made up of China wood oil, resin and naphtha; such a size could be made up for about \$1.50 per gallon. The cheap size commonly used is made up of gloss-oil at a cost of not to exceed 75c per gallon; but taking into consideration lasting quality and

labor expended, this is most expensive and unsatisfactory.

Fresco Size satisfactory for use on rough plastered walls may be made up as follows: Dissolve each separately in the proportions of one pound of glue to one gallon of water, one pound common yellow laundry soap to one gallon of water and one-fourth pound of alum to one gallon of water; the glue and soap solutions then being mixed together first, and after thoroughly mixed, the alum solution added and the whole well stirred together ready for application to the wall.

ESTIMATES ON PAINTING.

PAINTER'S ESTIMATE—(units of surface to be covered) \times (amount of material required to cover a unit) \times (cost of a unit of material) \div [(number of hours of labor required by a mechanic to apply the material to a single unit of surface) \times (hourly wage of mechanic) \times (number of units of surface)] \div (overhead charges, including scaffolding, brushes, drop-cloths, cartage, office expense and expense of supervision, etc.) \div (Contractor's profit, which varies with the supply and demand).

UNITS OF SURFACE USED ARE (sq. ft.), (sq. yd.—9 sq. ft.) or (square—144 sq. ft.).

AMOUNT OF SURFACE UNITS assumed for estimating purposes is increased at the judgment of the estimator. This is done to make proper allowance for increased labor and waste of material on account of broken and complicated surfaces, and so that prices per unit of labor and material can be maintained constant, the following enumerations being the assumptions most commonly used by estimators.

PLAIN D. & M. Wainscoting or partition stuff is measured once, actual surface, and is used as the standard of comparison. Other surfaces are increased in proportion as their difficulty of execution compares with D. & M. Wainscoting.

Sash for exterior are measured over the entire area instead of around each bar.

Shingle Gable, $1\frac{1}{2} \times$ actual surface area.

Dormer Windows $2 \times$ actual surface area.

Shingles, Rough, $1\frac{1}{2}$ to $2 \times$ actual surface area.

Shingles, Dressed, Dimension, actual surface measure.

Spindle work, measure 4 times solid on one side.

Square Spindle work and pickets, $4 \times$ one side measured solid.

Verandas with heavy columns and railings, etc., measure surface of ceiling and floors and all sides the same as though enclosed. Veranda, very simple in design, measure floor and ceiling and allow double area of brackets and columns.

Outside Blinds, measure $3 \times$ actual surface of one side.

INTERIOR.

Base Boards, measure not less than 1 foot in width regardless of actual width.

Picture Mouldings, measure 1-3 foot in width.

Single Doors, including trim, count as 35 sq. ft. to a side or 70 sq. ft. for both sides.

Interior Side of Windows, including trim and tracing of sash, average at 35 sq. ft.

Wall Decorations, measure ceiling solid and sidewalls 8-10 of actual area to allow for openings, or measure actual area and deduct $\frac{1}{2}$ to $\frac{2}{3}$ of all openings.

Badly Weathered wood work or cracked and damaged plaster, add from 1-10 to 3-10 to measurements determined as above.

Prices of standard materials are quoted in market reports and fluctuate with supply and demand. The estimator should verify these preceding each estimate. At time of going to press the following prices obtain:

White Lead Paste, \$12.25 per cwt.

Linseed Oil, raw, 85c per gallon.

Turpentine, 82c per gallon.

Paste Filler, about 14c per lb. in 100-lb. packages or 12c in bbls.

Interior Varnishes, about \$1.75 to \$3.00 per gallon.

Stains vary so much in price that they can not be listed.

First Class Exterior Varnishes, about \$4.25 per gallon.

Proprietary Oil Paints of best quality are sold to the painters at about \$3.25 to \$3.75 per gal., depending on color. The materials in a gal. of White Lead and Linseed Oil "Succeeding Coat" of paint costs exclusive of labor and coloring matter about \$2.40 at present market prices and the labor of mixing by hand and the expense for colors brings this hand-mixed paint up in price to about the same as proprietary paints of equal quality. Unless the ingredients composing paint are thoroughly incorporated the paint is not satisfactory. This proper mixing, if done by hand, requires considerable expensive labor.

In figuring the cost per gallon of a lead and oil paint we should not overlook the fact that the only way to correctly figure the price of paint is to figure it by the cost per square yard and not the cost per gallon. One gallon of pure lead zinc and linseed oil paint, machine made, will cover from 350 to 400 square feet per gallon, two coats on the average job, while lead and oil, hand mixed, will cover approximately 225 square feet, two coats.

LABOR REQUIRED.

COST OF LABOR—(number of hours of labor required by a mechanic to apply the material to the single unit of surface) \times (hourly wage of mechanics) \times (number of units of surface).

Wage per Hour—union scale obtaining in the locality where the work is to be executed. (In Chicago union scale is \$1.62½ per hour and the prevailing wage at this time under the Landis Award is \$1.00 per hour.)

Stopping knots with shellac requires in labor .2 of an hour's time to the square of surface.

Putting defects in ordinary wood work requires in labor .3 of an hour's time to the square of surface.

Oil Painting, single coat, requires in labor .57 of an hour's time to the square of surface.

Paste Filler Coat, including cleaning of wood work, requires in labor 1.33 hours' time to the square of surface.

Varnish, single coat, including light sandpapering, requires in labor .66 of an hour's time to the square of surface.

Cresote staining of shingles by $\frac{3}{4}$ dipping, requires in labor 1 hour of a mechanic's time to dip 1,000 shingles, which average to cover when laid, one square of roof surface.

Cresote staining, one brush coat on roof, requires in labor .8 hour's time to cover one square of surface.

Sizing of plaster walls with either glue or hard oil size requires in labor .33 of an hour's time to the square of surface.

Tinting with water color, fresco tints or calcimine averages to require in labor .44 hour's time to the square of surface to the man employed, providing not less than two men are employed on the work. (Ordinarily, one man cannot work alone at tinting of walls, for if he does so work, the work cannot be satisfactorily done and more time is required in proportion to the surface covered).

Sponging and washing walls requires in labor a variable amount of time to the square according to the amount of size used in coat to be removed and must be approximated by the estimator after examination and test.

VITROLITE



100 NORTH LA SALLE STREET BUILDING

This new building has Vitrolite wainscoting and stalls in the men's and women's toilet rooms. Particular note should be taken of the absence of head rail and the extreme simplicity of this new type of construction. Vitrolite is that ever-lasting, recreated rock slab material, which is absolutely non-absorbent, acid-proof and easy to keep clean.

DE PAUL BUILDING

Wainscoting consisting of glistening white Vitrolite ashlar panels and shining black trim recently installed in the corridors on upper floors of this new office building. These walls will never become stained or discolored, and as they are easily and quickly cleaned by merely wiping them off with a damp cloth, the cost of maintenance is negligible.



222 EAST CHESTNUT STREET

73 bathrooms and 36 shower compartments in this new, exclusive Apartment Hotel, have a Vitrolite wainscoting, consisting of white ashlar panels trimmed with apple green Vitrolite. A neat decorated border design on the surface of the Vitrolite cap is very effective. This installation is only typical of many similar ones recently completed.



PALMOLIVE BUILDING

The barber shop in this magnificent new building has Vitrolite wainscoting of black Vitrolite, with a neat decorated ivory Vitrolite frieze at the ceiling, providing a very interesting contrast. This installation is considered one of the most beautiful and typical of the new modern design in existence at the present time.

THE VITROLITE PRODUCTS COMPANY, 120 SO. LA SALLE STREET, CHICAGO, are the local Vitrolite Contractors. Recent outstanding installations made by them in Chicago are:

The De Paul Building,
Archts. K. M. Vitthum & Co.

Palmolive Barber Shop
Archts. Holabird & Root

100 N. La Salle Building,
Archts. Graven & Maygar

The Paradise Theatre,
Archit. John Eherson

Grant Hospital,
Archts. Schmidt, Garden
& Erickson

222 East Chestnut St.
Archts. Rissman & Hirschfeld

THE VITROLITE COMPANY

Display Rooms

120 So. La Salle St.
Chicago, Illinois

Sales Representatives in all Principal Cities and many Foreign Countries

VITROLITE
"BETTER THAN MARBLE"

Factory

Parkersburg,
West Virginia

GLASS AND GLAZING

PLATE GLASS.

Sizes and Thickness.—Plate glass can be made under the present improved methods in extreme sizes up to 250 square feet and in such measurements as 10 feet by 21 feet (or 120"x252") containing 210 square feet—12 feet by 20 feet (or 144"x240") containing 240 square feet—13 feet by 19 feet (or 156"x228") containing 247 square feet. Such extraordinary glass is very difficult to make, quite expensive and dangerous to clean or handle and, being especially made to order, entails delay in replacement when broken, requires special flat car shipment and special facilities for unloading and hauling, and the most expert and skilled glaziers in setting. Sizes are usually given in inches.

It is advisable to confine sizes to the ordinary limitations in order to secure prompt and economical deliveries from distributors' stocks.

On account of the extraordinary demand for certain sizes of plate glass for stock sizes in mirrors, windshields for automobiles, and stock door glazing, the proportionate production is below the consumption and a higher value is therefore placed upon these sizes, and their multiples.

$\frac{1}{4}$ " to $\frac{1}{8}$ ".—Polished plate glass is manufactured in thicknesses ranging from $\frac{1}{8}$ " to $1\frac{1}{2}$ "; the standard product runs from $\frac{1}{4}$ " to $\frac{3}{4}$ " full. The other thicknesses (whether thicker or thinner) are made specially, and at an increased cost.

The sash or rabbet for regular plate glass glazing should be made to accommodate glass full $\frac{1}{8}$ of an inch thick.

Thick Plate.— $\frac{3}{8}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", 1", $1\frac{1}{4}$ ", $1\frac{1}{2}$ ".

Glass thicker than the standard product is used for counter tops, deal plates, port and deck lights on ships, aquariums, etc.

Thin Plate, $\frac{1}{8}$ " to $\frac{1}{16}$ ".—One-eighth inch to three-sixteenth inch glass is used largely for residence windows and by car builders and for boat sash, automobile windshields, and for other special purposes where perfect surfaces, high polish and absolute clear vision is wanted, with minimum weight.

Weight.—Plate glass in regular glazing thickness ($\frac{1}{4}$ " to $\frac{3}{4}$ " thick) weighs $3\frac{1}{2}$ lbs. per square foot bare and may be computed at approximately five pounds per square foot boxed for shipment. A rule for figuring shipping weight of plate glass is found in the official price-list as follows:

Extend the glass at $3\frac{1}{2}$ pounds per square foot. Weight of box equals the contents of a plate of greatest width and length of those packed therein, multiplied by 10. Thus:

1 plate, 36"x96" } = $59 \times 3\frac{1}{2}$ = 206 $\frac{1}{2}$ pounds.

1 plate, 60"x84" }

Size of box 60"x96" = 40' x10 = 400 pounds.

606 $\frac{1}{2}$ pounds.

The raw materials may be said to be virtually the same in plate glass as in window glass—the main difference in the finished products being due to the great care exercised in selecting and purifying the ingredients, and the elaborate method of casting, grinding and polishing plate glass as compared to the simple and rapid process of producing window glass from blown cylinders.

Plate glass was first made in France in 1688 and the term "French Plate Glass" or "French Mirrors" has its origin from the development of the plate glass industry in France. The first cast plate made in the United States was produced in 1860 and perfected a few years later so that it may be noted that this is a modern product compared to window glass which was made dur-

ing the early settlement of this country, at Jamestown, Va., about 1608. The making of ordinary glass has been included in the industries of almost every country in the world and dates back to ancient Egypt, centuries ago.

Ingredients.—The principal ingredients are silica (white-sand) soda (soda-ash) and lime (lime-stone). Also arsenic, charcoal and cullet (broken glass).

As stated before, the method of producing plate glass widely differs from window glass and it is little known that the melting, casting, rolling, annealing, grinding and polishing of plate involves the mining of silica and coal, the quarrying of limestone, the chemical manufacture of soda-ash on a large scale, the reduction and treatment of fire-clay and an elaborate system of pot-making for crucibles, all of which requires an enormous financial investment, a multitude of men, and extensive factory properties.

It should be stated that the product of the American factories is, by comparison, equal in every way to the European plate glass in clearness, freedom from flaws and defects, homogeneity and finish.

Special Quality and Thickness.—The making of irregular thicknesses, or superfine quality for mirrors or other uses where special glass is needed, requires special processes and entails additional expense in producing, and the making of beveled plates and mirrors necessitates two more elaborate lines of work and machinery and a corps of experts and skilled workmen.

Pot Making.—Pots of fire-clay are such a heavy expense in plate glass manufacture and take so important a part in the successful making of plate glass that the subject deserves special notice. The different clays after being mined are exposed to the weather for some time to bring about disintegration.

At the proper stage finely sifted raw clay is mixed with coarse, burned clay and water. This reduces liability of shrinkage and cracking. It is then "pugged," or kneaded in a mill; kept a long time (sometimes a year) in storage bins to ripen; and afterwards goes through the laborious process of "treading." No machinery has thus far been invented by which the plasticity can be developed as does this primitive treading by the bare feet of men. The clay must be treaded many times. The building of the pots is a slow, tedious and time-killing affair; but this is essential.

Without extreme care, some elements used in the making of the pots might be fused into glass while undergoing the intense heat of the furnace; or they might break in the handling, and much depends upon the strength of the pots.

The average pot must hold about a ton of molten glass, and the average furnace heat necessary is about 3,000 degrees Fahrenheit.

After completion comes the proper drying out of the pots; and this is another feature in which the greatest scientific care is required. No pot may be used until it has been left to season for at least three months, and even a year is desirable. And after all this, the pot has but twenty-five days of usefulness.

Melting and Casting.—The pot, having been first brought to the necessary high temperature, is filled heaping full with its mixed "batch" of ground silica, soda, lime, cullet, etc. Melting reduces the bulk so much that the pot is filled three times before it contains a sufficient charge of metal.

When the proper molten stage is reached the pot is lifted out of the furnace by a crane, is first carefully skimmed to remove surface impurities, and then carried overhead by an electric tramway to the casting

STORE • FRONTS

•BY•

•ZOUJI•

IN

ROLLED BRONZE
ROLLED COPPER
EXTRUDED BRONZE
CHROMIUM PLATE



Electrolytic Finishes
Bronze Doors and Windows
Licensed Chromium Equipment



Zouji Drawn Metals Company

AND ASSOCIATED COMPANIES

INTERNATIONAL

INTERNATIONAL STORE FRONT COMPANY
STANDARD STORE FRONT CONSTRUCTION CO.
MODERN BRONZE STORE FRONT CO.
ZOUJI COMPANY OF CALIFORNIA
ZOUJI DRAWN METALS CO., OF NEW YORK, INC.

DISTRIBUTION

WRITE FOR
CATALOG

Factory and General Offices: Chicago Heights, Illinois

table. This is a large, massive, flat table of iron, having as an attachment, a heavy iron roller, which covers the full width, and arranged so as to roll the entire length of the table. The sides of the table are fitted with adjustable strips which gauge the production of plates of different thickness. The pasty, or half-fluid glass metal is now poured upon the table from the pot, and the roller quickly passes over it, leaving a layer of uniform thickness. The heavy roller is now moved out of the way, and then by means of a stowing tool the red hot plate is shoved into an annealing oven or lehr. The plates remain for some time in the lehrs, where the temperature is gradually reduced.

When the plate is taken from the annealing ovens it has a rough, opaque, almost undulating appearance on the surfaces. Only the surface, however, for within it is clear as crystal. First, it is submitted for careful inspection, and then goes to the cutter who takes off the rough edges and squares it into the right dimensions; and thence to the grinding room.

Grinding and Polishing.—The grinding table is a large flat revolving platform made of iron, twenty-five feet or more in diameter. This table is prepared by being flooded with plaster of paris and water; then the glass is carefully lowered, and men mount upon the plate and tramp it into place until it is set. After this, greater security is obtained by pegging with prepared wooden blocks; and the table is set in motion. The grinding is done by revolving runners. Sharp sand is fed upon the table, and a stream of water constantly flows over it. After the first cutting by the sand, emery is used in a similar manner. The plates are inspected after leaving the grinding room, and if scratches or defects are found they are marked.

There are also, not infrequently, nicks and fractures found at this stage; and in such case the plate must again be cut and squared, or if the defects are too great, the plate is broken up for cullet. The polishing is done on another special table by means of special reciprocating machinery, using rouge, (iron peroxide), applied with water, and rubbing the glass with blocks of felt so arranged that every part of the plate is brought underneath the rubbing surface. The grinding and polishing has reduced the original plate half of its thickness, sometimes more. The material washed away is lost and fully half the original weight of lime and soda has vanished, and even at the completion, the inspectors very carefully scrutinize the glass for excessive defects and reject that which is not up to quality.

Grading and Quality.—New plate is sea-green, looking at the "metal" through the edge, which gradually fades when exposed for a period to sunlight and weather, to a yellow or light brown color due to the action of the elements upon the chemical constituents of the glass.

In the finished product (glazing quality) there may appear some defects which in no way impair the value, beauty, or durability of the glass for ordinary use—such as small seeds or bubbles, short-finish, reams or surface scratches, which are accepted as contingent with the regular run of plate, and even an open bubble or shot-hole (not clear through both surfaces) is passed in standard glazing quality, providing the plate is comparatively free from other defects and of good color and finish.

Special Quality.—When glass of particular quality is desired, a special selection is necessary. This requires an expert in the grading and selection of the material. Sometimes necessitates cutting down larger sizes to minimize the amount of defects inherent with the regular production, and adds a proportionate extra cost to special quality plate.

Beveling.—The beveling of plate glass is of such interest and exemplifies such skill on the part of the workmen that a description of the process should be added to the information already written in the preceding chapter on plate glass.

The glass to be beveled is subjected to treatment in different departments of the beveling plant, each division working out its particular process in taking off the bevel and restoring the surface of the glass to its original polish.

Five divisions of skilled workmen are necessary; namely, roughers, emeriers, smoothers, white-wheelers and buffers (polishers) using different abrasive or polishing materials, such as sand or carborundum, emery, sandstone, pumice and rouge.

The roughing-mill or wheel is a circular cast-iron disc having a fine cut corrugated surface about 30" in diameter, revolving rapidly upon its bearings as a horizontal plane. Sand or carborundum is conveyed to the mill from above through a hopper with a stream of water, so that the sand gives the desired roughness between the iron and the glass while the water minimizes the friction and heat.

Roughing.—(1) The edge of the plate is brought into contact with the swiftly moving roughing wheel, and the sand cuts the bevel to the desired depth. Curved and pattern plates with incurves, mitres, etc., require an expert practiced eye and great skill on the part of the operator.

Emerying.—(2) In the first roughing process the beveled surface has been cut so deep by the coarse sand that it is necessary to follow with a finer abrasive in another mill to bring the bevel to a smoother finish, and emery or finer carborundum is used.

Smoothing.—(3) Then the rough grinding is still further smoothed in the stone mill, or smoother, which is constructed upon the plan of the iron roughing wheel, using a circular revolving sandstone of fine texture with water flowing upon it to reduce friction.

Polishing.—(4) The first polishing process is upon a wood wheel in an upright position which brings the bevel to a dull, milky polish by the use of powdered pumice in solution automatically splashed upon the wheel by a paddle.

Finishing.—(5) The final high gloss polish is put upon the beveled surface by the application of rouge upon the upright polishing wheel which is covered with a layer of thick felt.

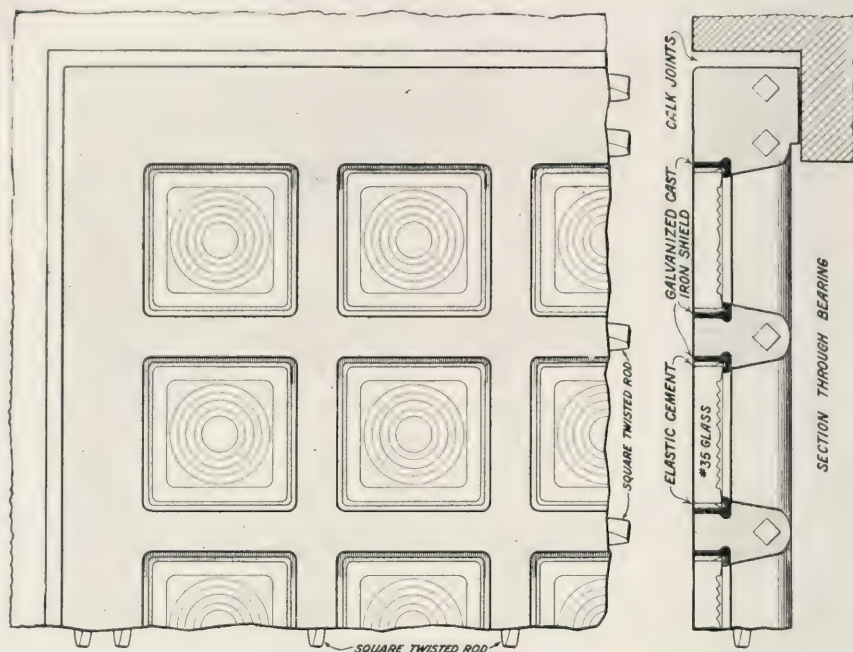
Regular Bevel 1½".—The standard width of bevel is 1½" and all beveled plate glass or beveled plate mirrors are furnished with 1½" bevel unless otherwise specified.

Slight scratches may be removed from the surface of plate glass by rubbing with pure thick felt mounted upon a hand-block, and using fine red or black rouge (moistened) as an abrasive. This must be skillfully done to avoid over-polishing or "burning" the delicate annealed surface of the plate.

Grinding and Polishing Edges.—The value of plate glass for furniture tops, desks and tables, show-cases, shelves and numerous other purposes has become generally recognized. The covering of glass with treated edges offers a clean, sanitary surface and an elegant appearance and also beautifies, protects and preserves the furniture.

The process of grinding and polishing the edges, or rounding of corners, curves or pattern lines, is similar to the beveling, except that the work is done on the edge of the plate instead of the surface.

The edge of the glass is rough ground, according to specifications, either rounded or squared or chamfered as desired, and finished through the polishing process—described in the previous chapter.



No. 35 Glass

SPECIFICATION

Sidewalk Lights to be of reinforced concrete construction glazed with No. 35 POLARISCOPE TESTED GLASS set in GALVANIZED CAST IRON SHIELDS with SPECIAL ELASTIC CEMENT all as made by RICHARDS & KELLY MFG. CO., 311 West Twenty-third Street, Chicago, Ill.

Manufacturer to furnish free of charge f.o.b. factory glass units for replacement of broken glass for a period of five years.

Manufacturer to give written guarantee to maintain construction against defective materials and workmanship for a period of one year from date of installation.

RICHARDS & KELLY MFG. CO.

311 WEST TWENTY-THIRD STREET

CHICAGO, ILL.

Manufacturers of Reinforced Concrete Sidewalk Lights
Reinforced Concrete Roof Lights
Sidewalk Doors · Coal Hole Covers

Wheel-Cut Mitred Work.—For decorative effects on door-plates, side-lights, transoms, partition-glass, etc., the rich effect of mitred design gives a tone of elegance, and emphasizes the beauty of the glass.

The lines are cut V shape into the surface of the glass by a vertical wheel with sharp edges, and the smoothing and polishing is accomplished by the same general process as on the beveled edge. This is identical in appearance and presents the richness and beauty of the finest cut tableware.

Mitred designs on plate glass mirrors or on rolled figured glass produce an elegant effect where special and elaborate decoration is wanted.

WINDOW GLASS.

The quality of window glass or sheet glass, also termed "blown" or "cylinder glass," has been improved by the modern methods of production, and much has been expended in the effort to make perfect blown cylinder material. Yet there are still some waves and general defects accepted in all window glass, due to the process of making, which differs entirely from cast and polished plate.

The glass is blown in cylinder form and flattened by reheating, which gives it a slight bend or bow, a possible variation in thickness in the larger sizes, and surface flaws.

The selection of the various grades is a matter of expert judgment. The large sheets produced, in single or double thickness and heavier, are cut to stock sizes according to the merits of the glass and graded in "AA," "A" or "B" quality. The defects being eliminated to the greatest possible extent. The ingredients, as we have said, are practically the same in window glass as in plate—it is wholly a matter of refinement and process which produces the different kinds of material.

Window glass is made by two methods—by "machine" or by "hand." The difference is in the blowing process—both producing the cylinder from which all window glass is evolved. The same general treatment of the cylinder, to produce flat sheet glass follows in both machine or human blown material, and both produce equally standard quality.

To make the cylinder the molten glass or "metal" is brought to proper consistency by extreme heat, and the glass in the human blown process is "gathered" upon the end of a tube (or blow pipe) from the furnace and blown into a huge cylinder by repeated heatings and blowings, until the material is all evenly distributed. From a globular mass about the size of a man's head, the blower swings the pipe into an alley or opening in the floor, blowing as he swings until the full sized cylinder is formed. This requires skill of the highest degree—the blower, by regulating the amount of material entering the cylinder, makes single strength or double strength or heavier glass as desired.

The blowing machine accomplishes the same result by purely mechanical process—the intricate working of the mechanism, the supply of molten glass, the air pressure, rapidity of action, making single or double thickness, being controlled by a single operator who appears to have supernatural powers, surely never dreamed of throughout the great stretch of years when the glass-blower was master of the art and accredited with imitable skill.

The cylinder is decapitated at both ends by an ingenious method of spinning a string of hot glass at the proper place, or by the use of a wire wrapped around the glass and electrically heated which causes the cap and crown to break off clean. The cylinder is then split lengthwise—placed in the flattening oven on a large circular stone, and as the heat is increased and as the glass begins to wilt it is quickly smoothed out to the shape of the flat stone, upon which it rests.

Cylinder glass cannot be perfectly flattened, and the waviness and bow or slight curve will always occur in this product.

In glazing, the bend or bow should be glazed outward in the sash—the bulge towards the exterior.

Sizes.—Window glass in double strength, or heavier, is made as large as 30"x90" or 38"x86" or 48"x80" and such extreme sizes containing twenty-five square feet, but it is inadvisable to use such glass in these measurements on account of the liability of breakage and the distorted vision due to waves, etc.

The same may be said of the extreme sizes of single strength which can be made up to 24"x60" or 30"x54" or 36"x50" in sizes containing ten or twelve and one-half sq. ft.

Crystal Sheet Glass.—A heavy blown glass, made by the same process as ordinary window glass and subject to the same inherent defects. Graded in "AA," "A" or "B" quality and made in various thicknesses: 26-ounce, 29-ounce, 34-ounce and 39-ounce ($\frac{1}{8}$ " thick).

In examining samples of small size for inspection of quality, it should be remembered that the large light of glass will show the natural waves and defects, while the small piece may appear nearly perfect.

It is not altogether a matter of expert judgment to determine the various grades and certain rules may be accepted governing window glass specifications.

Thickness and Weight.—Single strength measures approximately twelve lights to the inch, but a small variation either way is permissible. Single strength weighs approximately 16 ounces to the square foot. Double strength measures approximately nine lights to the inch. The thickness should be fairly uniform and the weight approximately twenty-four ounces to the square foot.

Factory Packages.—Window glass is packed in regular sizes approximately 50 square feet to the box up to the 100 united inch bracket (adding width and length), and 100 square feet to the box in sizes over 100 united inches.

Shipping Weights.—Single strength in factory packages weighs from 65 to 75 pounds to the box (shipping weight). Double strength in factory packages weighs from 85 to 110 pounds to the box, 50 foot boxes, (shipping weight.)

Double strength in 100 foot cases weighs approximately 225 pounds (shipping weight).

"AA" or First Quality.—"AA" quality should be clear glass, free from any perceptible amount of air bubbles or blisters, burnt specks or burns, cords and strings. It should have a good gloss and an even surface and be well flattened. By air bubbles it is understood that tiny blisters, or imperfections not perceptible on the cutters' table, but detectable when placing the sheet directly towards the light, would not be objectionable. This should be a careful selection in both single and double and should represent the very best that can be produced in window glass by the present methods.

"A" or Second Quality.—"A" glass is the normal selection of glass when no special selection is desired or specified and it admits of such defects as small strings or lines, small blisters when not too close to one another or located in the center of the sheet. Well flattened, the surface even, and devoid of noticeable scratches, cropper marks, burns and other prominent defects.

"B" or Third Quality.—"B" glass covers a wider range than either "AA" quality or "A" quality. It permits many of the defects inherent to the process of making such as waves, strings, lines, blisters, scratches, burns and other similar or equivalent defects.

WESTERN SANDBLAST

Established 1876

DESIGNS

CHIPT : ETCHED : SANDBLASTED

MODERNISTIC CARVING
ON GLASS OR WOOD

ANTIQUE WOOD EFFECTS

1458 W. KINZIE STREET

MONROE 5042



T. L. ROBINSON & CO.



Illuminated Directional

EXIT and
FIRE ESCAPE
SIGNS

Made to Specifications

Special Reflectors for Banks
TROUGH-CAGE & COVE LIGHTING

1458 WEST KINZIE STREET

TEL. MONROE 5042

This quality embraces everything below "A" quality, not stony or full of blisters or other large defects objectionable for any common purpose, such as heavy scratches, heavy blisters, cords and sulphur stains.

26-oz. Crystal Sheet.—A cylinder or blown glass heavier than the ordinary Double strength, and graded by the same rules as window glass in first, second or third quality, measuring approximately $\frac{1}{8}$ " in thickness (technically 125/1000 of an inch).

29-oz. Crystal Sheet.—A heavier blown cylinder glass, graded as above (technically 135/1000 of an inch in thickness).

34-oz. Crystal Sheet.—A heavier blown cylinder glass, graded as above, (technically 159/1000 of an inch in thickness).

$\frac{1}{8}$ " or 39-oz. Crystal Sheet.—A heavier blown cylinder glass, graded as above, measuring $\frac{1}{8}$ " in thickness.

While there is no uniformity in specifications governing the method of glazing different styles of glass, it is nevertheless advisable to call attention to some features which have been developed through the experience of the glass houses in this business.

It is especially desirable that all glass to be specified for a building be placed under one heading in the architect's specifications under the heading, "Glass and Glazing."

Accuracy is a necessity. Use a standard rule, true to gauge; specify the size plainly. For instance, 56 inches might be confused if written 5' 6", and cut 66 inches—as 5 feet 6 inches. Always specify width first. In measuring, it is advisable to allow a little play and measure inside the rabbet. See that rabbet is made to accommodate glass of the thickness ordered; i. e., order glass of proper thickness to fit rabbet. Measure the opening and see if all sides are squared. Especially if metal work is to be glazed, it is essential to have perfect fit, and in large sizes it is not uncommon to find a warped frame, or not exactly square, slightly different at one side as compared with the other.

Be specific. It is better to give an abundance of information rather than leave anything indefinite, or to be taken for granted. Mistakes will follow carelessness, and corrections involve loss of time and expense.

Plate glass should rest on two pads of felt, leather, lead, oakum or soft wood blocks, one near each end, not against bare metal, or at a single bearing-point which might cause breakage through settling of building, vibration, etc. The soft wood blocks or lead strips are to be preferred.

Do not fasten or bind glazing-mouldings too tight, as it is necessary to allow for expansion and contraction, vibration and readjustment of construction.

Use pure putty. Have sash-rabbet well oiled or painted so that putty will adhere. Give fresh putty glazing time to set before handling or hanging sash. Don't try to back-putty glass with corrugated or figured surface, as the putty cannot be removed from the ridges in the glass.

Steel sash glazing requires special putty for metal rabbets.

Caution.—When glass of any kind has been delivered to a building packed in cases or with paper between the sheets, it is advisable to store the glass under cover in a dry place and unpack it to avoid stains which come from drying out of damp hay, straw, paper, or other packing materials.

Glaze prism-glass with ribs inside—flat surface outside. Regular glazing is done with uncolored putty. If colored putty is desired it should be specified accordingly. Glass is not bedded in putty or back-puttled unless specially ordered or specified.

Window glass is regularly glazed with the natural bow or bend outside.

WIRE GLASS.

The use of metal frames, metal window sash and fire-proof construction has increased the demand for wire glass until the production of the material amounts to millions of square feet annually. Not only does this glass minimize the fire hazard, but its resisting and sustaining strength, its unyielding qualities even when cracked make it the logical glass for skylights, elevator shafts, stairwells, etc., where these features are a consideration.

Methods of Making.—Wire glass is made by three methods: 1. (Shuman process) by rolling a sheet of glass, laying the wire mesh upon it while the glass is still plastic, pressing the wire netting into the glass, and by a coincident process smoothing the surfaces. 2. (Appert or Schmertz process) by rolling a thin sheet of glass and laying the wire-mesh upon it and simultaneously pouring and rolling a second sheet of glass on top, imbedding the wire. 3. (Continuous or Solid process) by mechanically crimping the wire netting and placing same on the casting table and pouring and rolling the glass over it to produce a sheet of wire glass.

The introduction of the manufacture of wire glass is of so recent a date as to make the volume of consumption all the more surprising, especially when it is recalled that the product was comparatively unknown twenty years ago.

Standard Thickness $\frac{1}{4}$ ".—Wire glass is made in sheets as large as 60" wide and 130" long and in several thicknesses— $\frac{1}{4}$ " standard thickness for general use and approved by the National Board of Fire Underwriters.

Other Thicknesses.—Thinner wire glass is obtainable— $\frac{3}{16}$ " and $\frac{1}{8}$ " being made for special purposes, but the universal demand is for $\frac{1}{4}$ " or $\frac{3}{8}$ " or heavier, and no wire glass less than $\frac{1}{4}$ " thick is accepted under the rules of the Fire Prevention Bureaus or the National Board of Fire Underwriters.

Underwriters' Requirements.—It is necessary to follow certain rules and regulations in the making of fire-proof windows and construction, as provided by the National Fire Protection Association, and a copy of the requirements of the National Board of Fire Underwriters may be obtained from any member of The National Glass Distributors Association.

Extract from Rules and Requirements of the National Board of Fire Underwriters, Edition of 1906.

Thickness of Glass: Wire glass to have a thickness of at least $\frac{1}{4}$ of an inch at the thinnest point.

Size of Glass: The unsupported surface of the glass allowed, shall be governed by the severity of exposure and be determined in each case by the Underwriters having jurisdiction, but in no case shall it be more than 48 inches in either dimension or exceed 720 square inches.

Windows, doors and partitions should be specified for such sizes as 15"x48", 18"x40", 20"x36" and 24"x30" to conform to the above rule where dimensions are not to exceed 720 square inches. There are also restrictions and regulations governing the depth of rabbet ($\frac{3}{4}$ " deep) bearing of glass ($\frac{5}{8}$ ") and style of metal frames and sash to meet the demands of fire-retardant construction and permit reglazing, etc.

Polished Wire Glass.—Wire glass is made in ordinary rolled "rough" or "ribbed" or "figured" patterns, and when ground and polished for clear or transparent vision, is specified under the term:—"Polished Wire Glass."

This is not the quality of clear polished plate, but a polished rough wire glass, with the ordinary run of defects inherent with rough glass which has polished surfaces.

Make Customers Happy—Specify Cabot's Building Specialties

Firmly established with architects for over 40 years as standard in the construction and finish of houses and all other buildings.

Cabot's Creosote Shingle and Wood Stains The first shingle stains—invented 1882—still in the lead.

Cabot's Stained Shingles The best shingles procurable, stained with Cabot's Creosote Stains.

Cabot's Quilt In successful use for over 30 years.

Cabot's Collopakes - Old Virginia White—Used the country over when a soft white-washy white is desired. Lasting Semi-flat Collopakes that cover and penetrate better than paints. Interior Flat Waterproof Collopakes—Gloss Collopakes—Gloss Greens and all other colors that keep their gloss out of doors.

Constantly developed and improved by advanced scientific research and control, to meet the changing needs of the times.

Cabot's DOUBLE-WHITE Whiter than white lead and oil with twice the hiding power—semi-flat in finish—long in life.

Cabot's Building Specialties also include *Flexiblac*—a black paint that protects iron and steel at $\frac{1}{4}$ the cost of red-lead.

Conservo—to preserve fences, posts, etc.

Clear Waterproofing—for brick, cement, stucco.

Damp-proofing—a special plaster bond and protection against mortar stains for stone and concrete.

Samuel Cabot

Send for full information

5000 Bloomingdale Ave.
Chicago

Inc.
Manufacturing Chemists
141 Milk St., Boston

101 Park Ave.
New York

Branch Office
605 N. Michigan Ave.
Phone Superior 3768

Engineering Bldg.
205 Wacker Drive
Phone State 9893

Branch Office
307 N. Michigan Ave.
Phone State 7046

Branch Offices
344 S. Wabash Ave.
24 Van Buren St.
Phone Harrison 8133

Crofoot, Nielsen & Co.

BLUE PRINTERS

ARTISTS' DRAWING MATERIALS

[[Special Service Always — Speed and RESULTS]]
[[Big Floor Space and Equipment for Rush Orders]]



Telephone: State 2870

14 N. Franklin Street

CHICAGO

Appeal to Architects.

It is especially desirable that all glass to be specified for a building be placed under one heading in the architect's specifications under the heading—"Glass and Glazing."

Accuracy is a necessity. Use a standard rule, true to gauge, specify the size plainly. For instance, 56 inches might be confused if written 5'6", and cut 66 inches—as 5 feet 6 inches. Always specify width first. In measuring, it is advisable to allow a little play and measure inside the rabbet. See that rabbet is made to accommodate glass of the thickness ordered; i. e., order glass of proper thickness to fit rabbet. Measure the opening and see if all sides are squared, especially if metal work is to be glazed, it is essential to have perfect fit, and in large sizes it is not uncommon to find a warped frame, or not exactly square, slightly different at one side as compared with the other.

Be specific—it is better to give an abundance of information rather than leave anything indefinite, or to be taken for granted. Mistakes will follow carelessness, and corrections involve loss of time and expense.

Plate glass should rest on two pads of felt, leather, lead, oakum or soft wood blocks, one near each end, not against bare metal, or at a single bearing-point which might cause breakage through settling of building, vibration, etc. The soft wood blocks or lead strips are to be preferred.

Do not fasten or bind glazing-mouldings too tight, as it is necessary to allow for expansion and contraction, vibration and readjustment of construction.

Use pure putty. Have sash-rabbet well oiled or painted so that putty will adhere. Give fresh putty glazing time to set before handling or hanging sash. Don't try to back-putty glass with corrugated or figured surface, as the putty cannot be removed from the ridges in the glass.

Steel sash glazing requires special putty for metal rabbets.

Caution.—When glass of any kind has been delivered to a building packed in cases or with paper between the sheets, it is advisable to store the glass under cover in a dry place and unpack it to avoid stains which come from drying out of damp hay, straw, paper, or other packing materials.

Glaze prism-glass with ribs inside—flat surface outside. Regular glazing is done with uncolored putty. If colored putty is desired it should be specified accordingly. Glass is not bedded-in-putty or back-puttied unless specially ordered or specified.

Window glass is regularly glazed with the natural bow or bend outside.

METAL STORE FRONT CONSTRUCTION

The use of metal corner-bars, division bars and sills and the all-glass show-case or show-window has become so universal that few old-fashioned stores remain and all modern construction is marked by the absence of bulky posts or ponderous frames.

There are several standard makes of metal store-front construction, corner-bars, dividing bars, metal sill, etc., which fasten or secure, the glass with a metal locking or clamping member and provide for drainage, ventilation and illumination if desired, which may be obtained from the various members of the National Glass Distributors' Association.

We do not enter the brands of the several standard makes or recommend any special style of store-front construction, but it is well to make comparisons, giving attention to the necessity of substantial strength in the retaining members, and using metal bars and construction of sufficient weight to insure strength and rigidity.

It is advisable to send working drawings or detailed plans of store fronts—and the utmost care should be exercised in furnishing accurate dimensions when ordering, so

that a true fit of metal may be assured and proper allowance made for bearing contact or play of glass.

The architect should make definite specifications as to the material desired, giving names or numbers of bars, sill covering, jamb bars, jamb covering, transom bars, transom covering, style of metal finish, etc.

All Glass Clamp Store Fronts.—The show window of all-glass patent-front construction needs no special recommendation to those who have examined it, and the unobstructed view of the display as well as the continuous glass effect has made it a popular and attractive model for retail stores throughout the United States.

MIRRORS

The silvered surface of a mirror magnifies and accentuates the qualities of the glass to a great degree; hence it is necessary to use the finest grade of plate to secure good mirrors. This selection of quality necessarily entails the most scrupulous care in making and selecting glass for mirror purposes.

Every consideration must be given to both surface and general character, as the ordinary defects which would otherwise be unnoticed are sharply brought out by the covering of silver.

Silvering.—The formula of the silver solution for making mirrors varies but slightly with the different makers. The secret of success is in the process, and manner of treatment. Cleanliness is absolutely necessary. Chemically pure ingredients, distilled water and expert care with the proper facilities will produce mirrors that will stand for years without deterioration, whether by the cold or hot method.

After a thorough cleansing of the glass, removing all foreign substances from the surface, the "solution" is poured over the plate and by chemical precipitation a coat of pure silver is deposited.

This is permitted to dry and a preservative coating of shellac, with a coat of mirror-back paint completes the process. This is known as a patent-back mirror and is the standard highest grade.

A method of making mirrors by mercury process was tested for years but found unsatisfactory from a commercial standpoint, and has become obsolete.

Sizes and Thickness.—The sizes of polished plate glass mirrors are limited only by the sizes in which it is possible to make plate glass, and thin or heavy glass may be used as desired.

It must be remembered that extreme sizes in strictly clear plate of mirror quality are difficult to obtain and necessarily carry some ordinary technical defects, which cannot be entirely eliminated. The larger the glass the more likely these defects will appear.

Shocks.—The common sheet-mirror or looking-glass used principally for the reflection of light rather than for the detailed image, is known to the trade as a "Shock-Mirror," and is made from ordinary cylinder glass (window glass) and is very inferior in quality.

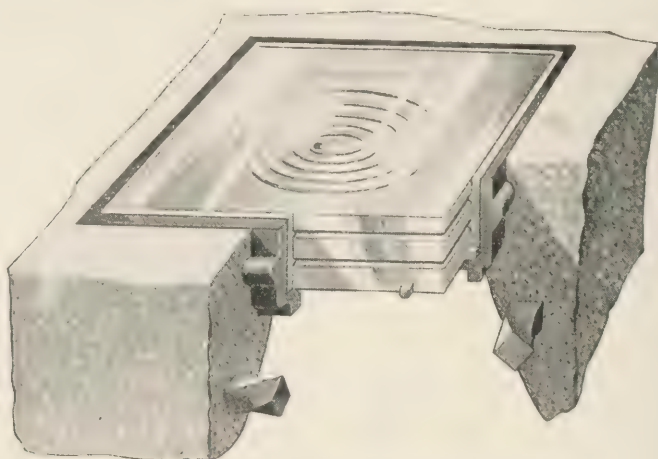
Proper Installation.—Mirrors are susceptible to the effects of extreme cold or heat and moisture, and should be mounted with proper protection against dampness. Care should be taken to avoid damp walls, or plaster which has not properly dried out, before installing mirrors.

In glazing French doors with mirrors, or on Colonial work where small mullion glazing is specified, it is essential to have the panels absolutely upon a uniform line and rabbets of accurate depth as the mirrors will otherwise reflect at different angles and distorted vision result.

A perfect effect may be obtained by using a back ground in large size mirror, and a false-mullion over all.

DAYLIGHT BASEMENT SPACE

With our New Sidewalk Light
Glass Guaranteed Against Breakage
— FOR 5 YEARS —



Cut-away View of 3 Way Armored Glass
showing Shield embedded in concrete

Natural Daylight — Has no substitute

Great Glass Area

Watertight

No Maintenance Expense

Write us for our new Waterproofing Details

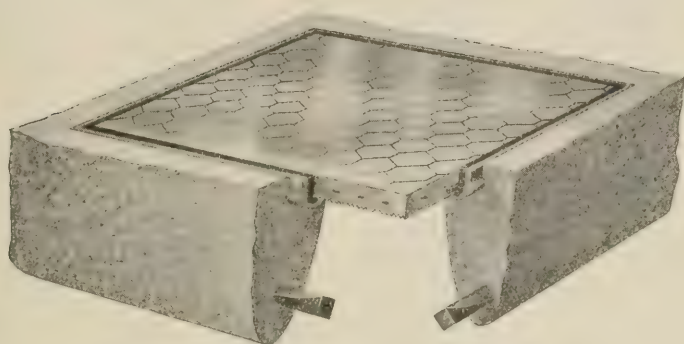
Don't Sacrifice Daylight

American 3 Way-Luxfer Prism Co.

1315 So. 55th Court, Cicero, Ill.

Daylight Through Roofs

With Permanent Construction
Glass Guaranteed for 5 Years



Cut-away View of 3 Way Daylight Roofing showing Shield embedded in concrete

Harmonizes with architectural lines
of modern structures

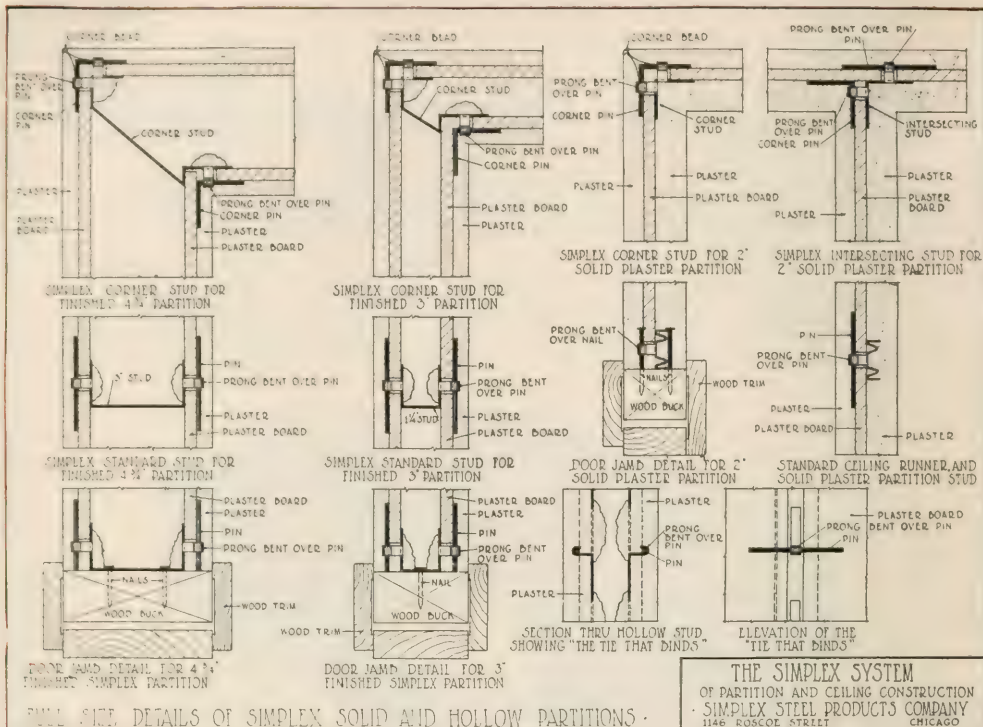
Fire-proof—Can be walked upon with Safety
Watertight and Weatherproof

SEND FOR DETAILS

DON'T SACRIFICE DAYLIGHT

American 3 Way-Luxfer Prism Co.

1315 So. 55th Court, Cicero, Ill.



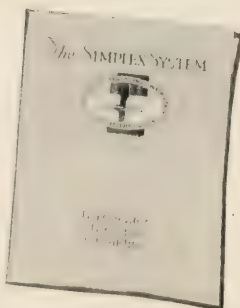
Reduction from Sheet of Full Size Simplex Details

THE SIMPLEX SYSTEM

of Partition and Ceiling Construction

Architects find that by specifying Simplex System non-bearing partitions and suspended ceilings they can greatly reduce costs of construction and at the same time give the building owner a thoroughly high-grade, fire-proof structure.

Simplex Steel Studs and gypsum plaster boards and plaster are the materials utilized to produce strong, thin, light-weight partitions and ceilings that are both fire and sound resistive.



This Handbook, profusely illustrated with photographs and blue prints, completely outlining The Simplex System, will be sent to architects upon request.

The patented design of the Simplex Stud and method of fastening the plaster board effect marked savings in labor, material and transportation costs. The System is adaptable to all types of buildings.

The subject is so broad and has so many phases that it is impossible to give you a thorough conception of Simplex advantages and methods except through our handbook or a personal demonstration. We shall be glad to give you this information and suggest that you call upon us.

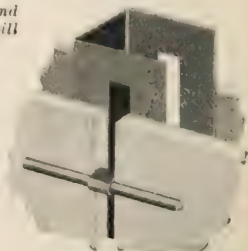


Simplex Steel Products Co.

1146 Roscoe Street

Chicago

Adjoining the C. M. & St. P. switch track



STANDARD RULES OF THE MEASUREMENT OF PLASTERING.

Adopted by the Employing Plasterers' Association of Chicago.

LATH AND PLASTERING

to be measured by the superficial yard, from floor to ceiling for walls, and from wall to wall for ceiling.

In rooms containing one or more horizontal angles between the floor and ceiling line, the ceiling to be measured from wall to wall, as though all walls were vertical, for contents of ceiling, and from floor to highest point of ceiling for height of wall.

OPENINGS.

Openings in plastering to be measured between grounds. No deductions to be made for openings of two feet or less in width. One-half of contents to be deducted for openings two feet or more in width. The contents on all store front openings to be deducted, and the contractor to be allowed one foot six inches for each jamb by the height.

All beams or girders projecting below ceiling line to have one foot in width by total length added for each internal and external angle.

No openings to be deducted from "solid" or "hollow" metal lath and plaster partitions nor for openings in suspended ceilings containing less than 100 square feet, where furring is carried around such openings by plasterer. No openings to be deducted from cement wainscot or base.

CORNER BEADS, ARCHES, ETC.

All corner angles of more or less than 90 degrees, beads, "bullnoses," quirks, rule joints, and moldings, to be measured by the lineal foot on their longest extension, and one foot for each stop or miter.

CORNICES.

Length of cornices to be measured on walls. Plain cornices of one foot girth or less to be measured on walls by the lineal foot. Plain cornices exceeding one foot girth to be measured by the superficial foot. Add one lineal foot to girth for each stop or miter. Enriched cornices (cast work), by the lineal foot for each enrichment.

Arches, corbels, brackets, rings, center pieces, pilasters, columns, capitals, bases, rosettes, bosses, pendants and niches by the piece. Ceiling or frieze plates over eight inches wide by the square foot.

COLUMNS.

All columns to be measured by the lineal foot for plain plastered columns.

CEMENT WAINSCOTING AND BASE.

All cement wainscot to be measured by the square foot, and cement base by the lineal foot.

GROUNDINGS.

All groundings for various classes of work to be as follows, unless expressly specified to the contrary:

Grounds for 3-coat lath work.....	1 inch
Grounds for 3-coat metal lath work.....	5/8 inch
Grounds for 3-coat metal lath work, on 1/2-inch iron furring.....	1 1/8 inch
Grounds for 3-coat metal lath work, on 1-inch iron furring.....	1 5/8 inch
Grounds for hard mortar metal lath work	5/8 inch
Grounds for hard mortar metal lath work, on 1/2-inch iron furring.....	1 1/8 inch
Grounds for 2-coat work on brick or tile	5/8 inch
Grounds for hard mortar on brick or tile	5/8 inch
Grounds for hard mortar lath work..	1 inch
Grounds for plaster board.....	1 inch

Where metal lath is spoken of it applies to all wire or metal lath.

The Employing Plasterers' Association of Chicago solicit the co-operation and support of Architects and others in the Association's efforts to set the highest standard possible for plastering.

In many of the branches of building construction, efforts are tending towards the use of better material and workmanship, no material or finish for a building combines so fully the essentials for fire protection and sanitation at so low a cost to the owner as does plastering, and no other material that enters so largely into the construction of a building presents so large an area of visible surface as does plastering. The cost of plastering represents only a small percentage of the total cost of a building.

It is a necessary base for the most expensive decorations and in itself provides the requisites necessary for a finish interior. The association believes that so important an element in the construction and finish of a building is worthy of being well done, and that the best workmanship and material if specified and called for will more than compensate owners and architects in their requirements for such grade of work. The Employing Plasterers' Association of Chicago respectfully submits the following outline specification for lath and plaster work; all trade names of material have been omitted. Architects will find a list of standard materials in the Hand Book and elsewhere.

TENTATIVE OUTLINE SPECIFICATION FOR LATH AND PLASTER WORK.

Sand. All sand to be clean, sharp sand.

Lime. All lime to be fresh burned lump lime or an approved quality of Hydrated lime.

Lath. All wood lath to be No. 1 white pine 1 1/2" lath free from sap and bark and even edged.

Nails. To be 3 penny fine 16 gauge wire nail.

Wire Lath. To be No. 18 Washburn and Moen gauge .0475" mesh painted or No. 24 gauge metal lath painted with ribs not less than 3/8" wide, lath cut from sheet metal shall weigh not less than 3.4 lbs. per square yard.

Stucco. To be fresh.

Hair. To be well whipped cattle hair.

Fibre. To be long vegetable fibre.

Portland Cement. To be a brand that shall meet the requirements of the standard specifications for Portland Cement of the American Society for testing materials as revised to date by said Society.

Hard Plaster. To be an approved straight gypsum plaster.

Metal Corner Beads. To be a bead not less than 24 gauge galvanized.

Lathing. All wood lath to be nailed to each stud joist or bearing with joints broken not over seven lath to a break, no diagonal nor vertical lathing allowed, a full 3/4" key to be left for lime mortar and not less than a full 1/4" for hard plaster.

Lime Mortar. To be composed of clean coarse sand, fresh lump lime and hair and fibre in proper proportions and to be well slaked and protected.

Putty. Lime putty to be run off in a tight putty box, thoroughly tempered and screened through a fine putty screen.

Hard Finish. To be composed of cold run lime putty, fresh plaster of paris and sand to be well troweled to a smooth even surface, free from blisters, checks and other imperfections.

Sand Finish. All float sand finish to be composed of lime putty and sand to be

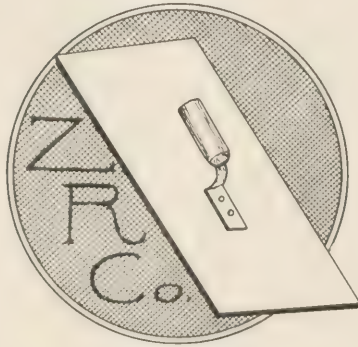
ZANDER REUM CO.

CONTRACTORS FOR

Plain and Ornamental

PLASTERING

For Over Fifty Years Our Standard



Quality Plastering

OSCAR A. REUM
President

ELMER W. ZANDER
Treasurer

H. E. REUM
Secretary

UNION TRUST BUILDING, CHICAGO, ILLINOIS

7 South Dearborn Street

Established 1872

Telephone: Randolph 1588

water floated with a float to an even granular or sand surface.

Scratch Coat. All scratch coating to be well laid on and surface covered with a full coat which is to be scratched with wire scratcher to be well under cut for the brown coat, all lime mortar scratch coating to be dry before applying the brown coat.

Brown Coat. All brown coating to be well applied, allowing only sufficient space for the finish coat, brown coat to be rodged and screeded with all angles straight and true, all hard plaster to be mixed in accordance with the directions of the manufacturer and no hard mortar to be floated with water nor shall any "dead" material be retempered or used.

Wire or Metal Lath. Shall be lapped at each joint or seam and shall be stapled every six inches with blued or galvanized staples.

Band Iron Furring. The following shall be furred with $\frac{1}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{4}$ " or 1" corrugated band iron furring, such furring to be stapled to bearings and the wire or metal lath to be stapled over such band iron furring.

Suspended Ceilings. To be constructed with $1\frac{1}{2}$ " or 2" flat bars, angles or channels as may be called for, such principals shall be spaced 4' 0" on centers, hung with flat bar or not less $\frac{1}{4}$ " rod hangers every 4' 0" securely fastened with approved clips to the structural framing or through the floor construction. In the event these hangers go through the floor construction they shall be provided with 6" channels or flat bar anchors, no hanger shall be supported from the bottom flange of the tile arch. The flat bar, angle or channel runners shall be cross furred 12" on centers with $\frac{3}{4}$ " steel channels, securely secured to the principals with rod clips, entire construction to be lathed with No. 18 W. M. gauge $\frac{3}{8}$ " mesh painted wire lath or No. 24 U. S. Gov. standard gauge metal lath, lath to have lapped edges at each joining and to be tied to the channel furring every 6" with 18 gauge galvanized tie wire.

Furring. All false beam or cornice furring to be constructed of $\frac{3}{4}$ " channel or 1" flat bar brackets not over 2' 0" apart lined out with intermediate furring supports and anchored or toggle bolted into the construction to be made to conform to the design so as to allow for a minimum of plaster, such brackets to be covered with 18 gauge wire or 24 U. S. Gov. gauge metal painted lath secured with 18 gauge galvanized tie wire, such furring to conform to the latest and best practice as to durability of construction.

Cornice Work. All moulded beams and cornices will be screeded and run in place with moulds, with true lines and accurate mitres.

Ornamental Work. All ornamental work to be modeled by artistic modelers who will be approved by the architects. Models to be submitted for approval and no casts to be made until such models have been approved, all patterns to be gotten out by skilled mechanics with true and accurate lines.

Casts. All casts to be well made, the contractor to supply a sufficient number to meet the requirements of the job, all casts to be made in line, well and truly undercut and free from warps and other irregularities supplying all necessary shrinkers and stretchers.

Rough Casting. Lath the exterior of the house with 18 gauge wire or 24 U. S. Gov. metal painted lath stapled over 1" band iron furring scratch coat with mortar composed of 2 vols. of coarse, sharp sand 1 vol. of approved Portland cement, to which mixture add 15% of rich lime mortar, thoroughly scratched and undercut when this coat was "set," brown with mortar composed of 3 vols. sharp sand to 1 vol. Portland cement rod and straighten all surfaces and when this coat has "set" rough cast with mortar composed of 3 vols. of sharp sand or pebbles to

2 vols. Portland cement dashed on surface with a scoop or paddle to an even artistic finish.

Exterior Plastering on Wood Lath. Lath the exterior with No. 1 soft pine one-inch lath, nailed to each stud furring or bearing with not less than a 3 penny nail with full open $\frac{3}{8}$ " key space and not over seven lath to a break, plaster with 3 coats of cement plaster as called for under exterior plaster on metal lath, note the use of "hard plasters" so called are not recommended for exterior plastering.

Concrete Walls and Columns. All work on concrete walls and columns shall have such concrete well brushed with steel brushes and such concrete shall then be covered with a light coat of an approved bond cement as a bonding coat for the finish coat.

Concrete Ceilings. Shall first be washed with a solution of muriatic acid and such ceilings shall then be plastered as above.

Painted Walls. Walls that are to be coated with waterproofing shall first be scratch coated, then browned and finished.

Patching of Plaster. All patching of plaster damaged by other mechanics shall be paid for at the uniform scale of prices adopted by the Employing Plasterers' Association of Chicago, which scale of prices is set forth in the Hand Book.

Workmen's Compensation. This contractor shall insure his workmen under the provisions of the Workmen's Compensation Laws of the State of Illinois. This contractor shall also insure his liability for injury or death to "the public."

Scaffold. This contractor shall supply all necessary tools, scaffold and other appliances necessary to fulfill the requirements of the job, all scaffolding to be erected and maintained in accordance with the laws of the State relating to scaffolds.

Requirements. By Building Code in buildings of ordinary construction. At least three coats of plaster on all wood lath to 1 inch grounds.

By Union. All plain and ornamental plaster to the same contractor, the base coat of Portland cement under encaustic tile, cement base when installed independent of the floor or if more than 6" in height. All plastering regardless of the nature of the structure or of the material used.

RECOMMENDATIONS.

The use of soft pine lath, specify No. 1 white pine lath nailed to each stud, joist or bearing with 3 d. fine 16 gauge wire nails, with joints broken at least once in each seventh course or lath.

For better residence work specify one inch lath as above.

Wire or metal lath, specify No. 18 Washburn and Moen gauge wire lath $\frac{3}{8}$ " mesh, painted, or No. 24 U. S. Gov. standard metal lath painted, for better class work specify wire lath woven from galvanized strand or metal lath galvanized.

The use of wire or metal lath plastered insures slow burning construction, helps to prevent settlement cracks and bonds and ties all parts of the structure together, its use is called for in almost every building, particularly on basement ceilings to prevent or retard fire on ceilings with long span joist construction on store ceilings and under other space subject to heavy use or abuse. Its use should also be general in all better class building, in rated buildings its use throughout entitles it to better classification for insurance.

The Association recommends the use of three coat plastering. This will insure a far better class of work, a better bonding together of buildings of ordinary construction, due to the use of a greater body of material. The application of the second base coat enabling one to straighten out rod and line work. Specify three-coat dry work, first coat to be a scratch coat well scratched and un-

TELEPHONE: HAYMARKET 7615

McNulty Bros. Company

*Architectural Sculptors
& Plasterers*

1028 West Van Buren Street

CHICAGO

PITTSBURGH, DETROIT AND CLEVELAND

der cut. When dry, apply a brown coat, this brown coat to be screened and rodged and when dry apply a finish coat.

The following suggestions are offered for guidance:

Sand. The use of clean, coarse, sharp sand is essential for good plastering.

Metal Lath. Should be laid with lapped edges or joinings and should be stapled to bearings every 6". No suspended ceilings should be supported from the bottom or soffit of tile.

Portland cement base coat behind encaustic tile, Opalite or kindred material should be specified under "Plastering" with one rodged coat scratched on tile or brick or a scratch and rodged brown coat scratched on metal or wire lath. We do not recommend Portland cement direct to gypsum partition or gypsum furrings.

Damp proofed, waterproofed or painted walls and ceilings are required to be given 3 coats. If a finish coat is desired, it should be so specified. All lathing plain and ornamental plastering should be specified under one heading in order to avoid divided responsibility for final results.

JURISDICTION CLAIMS.

By Plasterers' Union, any and all plastering regardless of the nature of the material, or of the structure to which it is applied, including Scagliola made under the "New Process" so called.

By Lathers' Union, all lathing, metal corner beads and all light iron furring designed, specified or used primarily as a support for lath and plaster, including "Hi Rib."

By Hodcarriers and Building Laborers' Union, all scaffolding erected for the use of plasterers.

PATCHING OF PLASTERING AFTER OTHER TRADES.

Patching of plastering after other mechanics shall not be done as a part of the contract price, and shall be paid for at the following scale of prices which have been adopted by and are recommended by the Employing Plasterers' Association of Chicago.

In accordance with wage agreements effective, and present prices of materials, the following scale of prices for patching of plastering after other mechanics and for work done upon a time and material basis, is respectfully submitted.

The prices herein include cost of insurance of men under the provisions of the Workmen's Compensation Laws of the State of Illinois.

Foreman Plaster	\$2.60	per hour
Plasterers	2.35	per hour
Foreman Lather	2.60	per hour
Lathers	2.35	per hour
Plasterer Laborer	1.50	per hour
Mortar	3.50	per bbl.
Putty	4.00	per bbl.
Hydrated Lime .....	.80	per bag
Neat Hard Plaster.....	1.40	per bag
Stucco	1.40	per bag
Metal or Wire Lath.....	.45	per yard
1½" Pine Lath.....	.90	per bunch

Owing to abnormal conditions material prices are subject to change without notice, and labor scale will be proportionately increased where bonuses are required to be paid in order to get men.

18 gauge ¾" mesh painted wire lath or 24 gauge expanded metal painted45	per yard
--	-----	----------

Where seven or more men are employed in one gang on same kind of work, foreman's time will be charged continuous while work is going on; where less than seven men are employed in one gang on same kind of work, foreman's time shall be counted one hour for each seven hours of men aggregate time employed on this work, unless foreman's time is required constantly, when he shall be so paid.

CITY ORDINANCE.

Be it ordained by the City Council of the City of Chicago:

Section 1. That Section 605 of the Chicago Code of 1911 be and the same is hereby amended so as to read as follows:

605. Wood Lathing and Plastering.) (a) In all buildings of ordinary construction, where the use of wood lath and plaster is permitted under the provisions of this chapter, such wood lath and plaster shall be done in accordance with these specifications:

Wood lath shall not be over one and one-half inches wide, and shall be nailed to each stud, joist or bearing with not less than a three-penny fine 16 gauge nail; lath to have joints broken with not over seven lath to a break; lath to be spaced not less than one-fourth of an inch apart. All wood lath must be covered with at least three coats of plaster; such lath and plaster to finish to a total thickness of at least seven-eighths of an inch; no dirty or loamy sand to be used in the mortar or plaster.

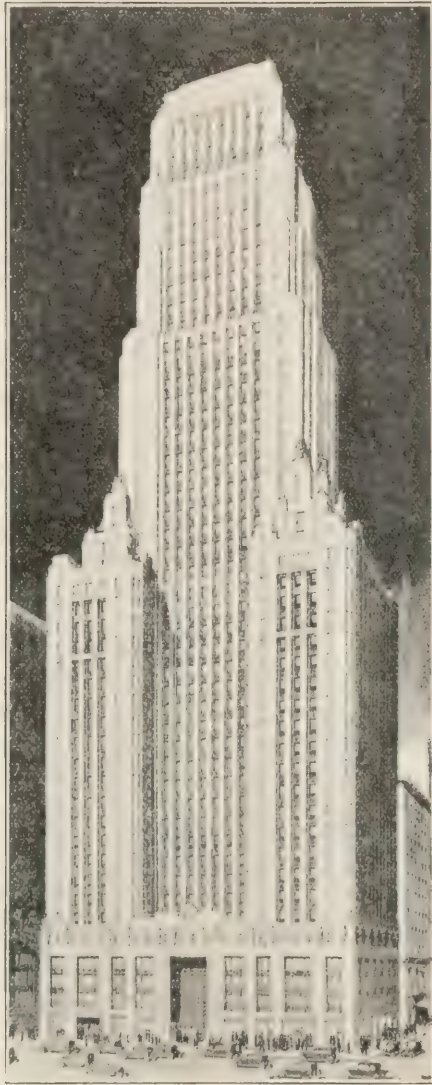
(b) In every building of ordinary construction which contains one or more rooms used for habitation or living purposes, the walls and ceilings of all rooms, including stores (except basement and attic rooms not used for habitation or living purposes), throughout the building shall be covered with not less than three coats of plaster of the thickness and quality hereinbefore in this section prescribed.

Provided, however, that where such building does not exceed one story and basement in height and contains a room or rooms used for the purposes of Class I as defined in this ordinance, a metal ceiling may be installed in the room used for the purpose of Class I; and provided further, that where such building of ordinary construction and containing one or more living rooms is more than one story and basement in height and contains a room or rooms used for the purposes of Class I as defined in this ordinance, a metal ceiling may be installed in such room used for the purpose of Class I according to the following provisions:

The ceiling of the room or rooms used for the purpose of Class I shall first be plastered with at least two coats of plaster on wood lath; wood lath to be not over one and one-half inches wide, and shall be nailed to each stud, joist or bearing with not less than a three-penny fine 16 gauge nail; lath to have joints broken with not over seven lath to a break; lath to be spaced not less than three-eighths of an inch apart. All wood lath to be covered with a heavy coat of mortar; such lath and plaster to finish to a total thickness of three-quarters of an inch in thickness. Before applying such metal ceilings, a wood strip not less than seven-eighths of an inch by one and one-quarter inch wide shall be used under every lap bead, or nailing flange at the intersection of all plates. Strips to be not more than two feet on centers in the direction of length of rooms with a cross strip every four feet on centers. A wire nail not less than three inches long shall be used in every strip at every joist in the surface to be covered. Metal plates to be not lighter than 29 gauge in thickness and nailed to every six inches on the lap.

(c) Where said metal plates are applied on walls of buildings of ordinary construction containing one or more rooms used for habitation or living purposes, plastering upon walls must conform with the requirements of this ordinance for plastered walls. A strip three-eighths of an inch in thickness may be used upon which to apply the metal, same to be nailed to every studding with a nail not less than two and three-quarter inches long; steel plates used on walls to be not lighter than 29 gauge and applied same manner as herein provided for ceilings.

Section 2. This ordinance shall be in force and effect from and after its passage and due publication.



One North La Salle St., Chicago, Ill.
Karl Vitzthum & Co., Architects

Telephone Central 6626

James J. Brown Plastering Co.

MIDLAND BUILDING

176 WEST ADAMS STREET

CHICAGO, ILL.

RULES OF MEASUREMENT FOR MASON WORK

As adopted by the Builders Association of Chicago and the Associated Builders of Chicago.

Introduction.

The following rules are the expression of a custom founded in equity and prevailing in this city from its earliest days.

If to furnish and lay one thousand brick in a plain dead wall cost ten dollars, another piece of brick work of equal cost must be measured as of the same contents, even though it does not take one-fourth as many brick.

The plain dead wall, in stone as well as brick work, is taken as the standard, and more difficult, complicated ornamental and hazardous kinds of work are measured up to it, so as to make the compensation equal. To illustrate: If in one day a man can lay two thousand brick in a plain dead wall, and can lay only five hundred in a pier or arch in the same time, the cost of labor per thousand in such work is four times as much as in a wall, and is entitled to extra compensation; but instead of varying the price, the custom varies the measurement to compensate for the difference and thus endeavors to secure a uniform price per thousand for all descriptions of ordinary brickwork, instead of a different price for the execution of the various kinds of work.

This is the principle underlying the system.

If any new rules or new applications of old rules should be found in the following, we can only say in their recommendation that we have carefully considered them in all their bearings, endeavoring to secure equal justice to owner as well as contractor, and that they will form the standard for deductions as well as for compensation for extra work.

The units of measurement of masons work are:

- For Excavation, the cubic yard.
- For Concrete, foundations, the cubic foot.
- For Concrete, floors, the superficial foot.
- For Dimension stone, footings, the superficial yard.
- For Dimension stone, bridge masonry, the cubic foot.
- For Dimension stone, surface dressing, the superficial foot extra.
- For Rubblework, the cubic foot.
- For Rubblework, surface dressing, the superficial foot extra.
- For Brickwork, common, the thousand brick.
- For Brickwork, pressed, the superficial foot.
- For Tuckpointing, cleaning fronts, the superficial foot.
- For Plastering, plain surfaces, the superficial yard.
- For Plastering, cornices, the running and superficial foot.

Excavation.

To be measured and computed by the actual amount of material displaced—no allowance for rehandling.

Concrete. Floors—Foundations.

Measure actual contents.

Floors to be measured by the superficial foot of surface between walls.

No deductions for tile drains, nor for any pier, chimney breast, plaster or other projections of walls of ten feet or less in area.

Where concrete takes the place of stone or brickwork, figure the contents the same as you would brick or stonework.

It is not safe to do concrete work at less than 30 degrees above zero.

Dimension Stone—Footings.

Footings to be measured each course separately—no deduction for drain or other

openings under walls two feet or less in width.

Bridge Masonry.

Compute actual cubic contents.

Surface dressing of all kinds, extra.

It is not safe to do Dimension stone work at less than 25 degrees above zero.

Rubblework.

Footings to be measured by actual contents.

Note.—Footings are all such foundation courses, not exceeding sixteen inches in height each, as are wider than the body of the above.

Note.—In the following the term Corner is used for salient angles of walls, and Angle for re-entering angles.

It is not safe to do rubblework at less than 25 degrees above zero.

External Walls.

Girt building and add thickness of wall for each external angle.

Partition Walls.

Intersection of partition walls two feet or less in width to be measured double; if wider, add four cubic feet to actual contents of every intersection for each foot in length.

Beveled Corners.

For each corner of wall more or less than ninety degrees, add one foot six inches to length of wall.

Circular Walls.

For round walls add one-fifth of length of girt measure.

Pilasters, Etc.

All projections, such as chimney breast, piers connected with walls, and pilasters to be measured actual cubic contents contained therein, and one cubic foot added thereto for each corner for every foot in height.

Piers.

Independent square piers to be measured by the same rule.

Polygon and round pier work at special rates.

Recesses, Etc.

Recesses and slots to be measured solid, and in addition thereto allow one cubic foot for every foot in height.

Arches.

Stone arches are classed as cut-stone work.

Openings.

Deduct contents of windows, doors and other openings, measuring from top of sill to spring of arch, and add two feet of wall for each jamb for every foot in height of opening.

No deductions are to be made for cut-stone trimmings and lintels.

Brickwork.

Note.—Different cities make different brick; in reality the products of no two brickyards are entirely alike in size, nor, for that matter, all bricks burned in the same kiln. The necessity of acknowledging some standard for purpose of measurement and calculation is obvious. In these rules the dimensions of a brick are understood to be 2 by 4 by 8 inches. We therefore speak of 4-inch walls, meaning the width of one brick; of 8-inch, meaning the width of two-bricks, and 12-inch walls, meaning the length of one and width of another brick, etc., although the actual width of wall will be more or less in excess of these measures.

PLASTERING



*Some of the more recent work executed by us includes
the following buildings in Chicago:*

Belden Hotel
Sovereign Hotel
Parkway Hotel
Southmore Hotel
Sheridan Plaza Hotel
Jackson Towers Apartments
3740 Sheridan Road Apartments
3000 Sheridan Road Apartments
1400 Lake Shore Apartments

Peabody Hotel, Memphis, Tenn.

Wolford Hotel, Danville, Ill.

Battle Creek Sanitarium Addition,
Battle Creek, Mich.



Estimates will be furnished



BURSON BROTHERS

118-120 East 30th Street

CHICAGO

Telephone Michigan 2077

Every superficial foot of "one-half brick (or 4-inch) wall" to be estimated at seven and one-half bricks; of "one brick (or 8-inch) wall" at fifteen bricks; of "one-half brick (or 12-inch) wall" at twenty-two and one-half bricks; of "two brick (or 16-inch) wall" at thirty bricks, etc.—increase the number of brick by seven and one-half for every additional half-brick in thickness of wall.

It is not safe to lay brick at less than 20 degrees above zero; brick laid in cement at less than 25 degrees above zero.

External Walls.

If sixteen inches thick or less girt building and add thickness of wall for each external angle.

When thicker, add to actual contents of each corner one and one-half cubic feet for every foot in height.

Allow for wall ends as for corners.

Round Walls.

Sixteen inches thick or less.

For circular walls, or radius sufficiently large to obviate the necessity of using specially molded or cut brick, add one-fifth of length to girt.

When thicker allow for sixteen inches of such wall as per above rule, and measure all in excess as straight work.

Cut or molded at special rates.

Beveled Corners.

For each corner of wall of more or less than ninety degrees, add one foot six inches to length of girt.

Partition Walls.

Sixteen inches thick or less. Intersection of partition walls (bonded together in any manner—not abutting) to be measured double.

When thicker, add one and one-half cubic feet to actual contents of every intersection for each foot in height.

Partition walls connecting with stone walls to be measured one foot into such wall.

Chimney Breasts and Pilasters.

All flues and hollows in chimneys four feet or less in area to be measured solid.

When larger deduct one-half contents of flue.

For all chimney breasts and pilasters add eight inches to face for each corner and multiply length so obtained by width (projection).

Detached chimneys in buildings and plain chimney tops to be measured solid and one-half of one cubic foot to be added for each corner of every foot in height.

Stacks.

Chimney stacks at special rates. When square, find cubic contents, measuring hollow walls solid, and deducting flue. When round or octagon, take length of diameter for side, and measure as though it was square.

Piers.

Independent piers to be measured like chimneys.

Hollow Walls.

Hollow walls to be measured solid.

Stone Fronts.

Stone fronts backed with brickwork, deduct thickness of ashlar from width and figure ordinary walls.

Gables and Wall Tops.

Whenever clipping of brick is required, add to actual contents the length of line of clipping by one foot by thickness of wall.

Cornices and Belts.

If of running courses only, multiply length by height (greatest grit in the cut) by greatest projection.

If enriched (by corbels, brackets and panels), multiply other dimensions, as given, by greatest grit length.

Ledges.

Multiply length by height by greatest projection.

Projections.

All other projections, if four inches or less, to be measured four inches; if above four inches, and not exceeding eight inches, to be measured eight inches; if above eight inches, and not exceeding twelve inches, to be measured twelve inches, etc.

Gauge Work.

Gauge work at special rates.

Openings.

Openings to be measured from top of sill to spring of arch and shortest distance between brick jambs for width.

No deductions to be made for openings two feet six inches or less in width.

One-half of contents to be deducted of openings from two feet six inches to six feet in width.

For openings of more than six feet in width allow one foot six inches by thickness of wall by height for each jamb.

Slots, Panels, Etc.

No deduction to be made for slots, chases, niches, panels or other recesses of four feet or less in width; if wider deduct contents and add two cubic feet of wall for every foot in height.

Trimmings.

No deductions in measuring brickwork for cut-stone or other trimmings, bond-blocks, timber, joists or lintels.

Arches.

Arches—not gauged.

In vaults, multiply length of chord at spring of arch by height from chord to extrados by thickness of arch.

In walls: find contents of arch by same rule and add to wall measurement.

In sewer and tunnel arches multiply length of extrados by thickness of arch.

Floor Arches and Brick Paving.

Floor arches and brick paving to be measured by the superficial foot and by rule given for measuring concrete. Deduct well-holes.

Brick-Nogging.

Measure as ordinary brickwork. Deduct full openings—not studding.

Cutting.

Cutting of joists or other holes by the piece; of slots, panels and recesses by the lineal foot.

Toothing.

When ordered by the owner or his superintendent to tooth, rack or block, in consequences of delay, of iron, stone or other material, that masonwork may connect with, such toothing, racking or blocking shall be measured as extra work, as follows: Increase girt length of such line by one-half, and multiply by one foot of thickness of wall.

Pressed Brickwork.

Measure all exposed surfaces of brick by the superficial foot.

Cut-Stone Setting.

Measure vault covers, flagging, curbing and ashlar by the superficial foot, coping and belt courses by the lineal foot; all other cut stone by the cubic foot.

Tuckpointing and Cleaning.

Tuckpointing and cleaning and pointing stonework to be measured by the superficial foot of exposed surfaces.

Deadening.

Deadening to be measured by the superficial yard, floor measure, between walls—take out well holes.

William Balhatchet Company

Plastering Contractors

228 N. LA SALLE STREET

Telephone Central 1373

CHICAGO

Telephone Harrison 5791

Sutton Plastering Company

Contractors for

PLASTERING

PLAIN AND ORNAMENTAL

1727 Kimball Building

CHICAGO

CHICAGO

Telephone Central 9369

CLEVELAND

LENNOX-HALDEMAN CO.

Plastering

208 SOUTH LA SALLE STREET

CHICAGO

STUDIO AND YARD:

Sacramento Boulevard, at Ohio Street

TEL. NEVADA 0035

Telephone State 4993

N. J. PARENT COMPANY

Plastering Contractors

Plain and Ornamental

5 South Wabash Avenue

CHICAGO

Phone: Franklin 2605

GOSS & GUISE

Plastering Contractors

510 Builders Building, 228 North La Salle Street

CHICAGO

HENRY W. KALTEUX

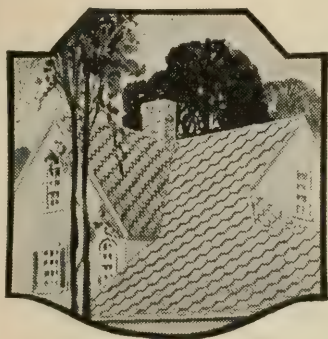
KALTEUX-BROWN COMPANY

Plain and Ornamental

Plastering Contractors

25 North Dearborn Street

Tel. Dearborn 3436



MODERN IDEAS
Demand Color Effects
WHICH PLEASE

NU-TILE

Spanish Blend Hexacons

Satisfy the Most Critical Client

Samples and Information on Request

AMALGAMATED ROOFING CO.

MANUFACTURERS

431 South Dearborn Street, Chicago

Phone HARRISON 0797



STADIUM, GRANT PARK, CHICAGO, ILL.

C. H. HOULTON, *President*

W. L. HOULTON, *Vice-President*

J. C. DeWITT, *Sec'y-Treasurer*

LAKE SUPERIOR PILING COMPANY

MANUFACTURERS AND DEALERS IN

WOOD PILING OF ALL KINDS

We are Headquarters for Bridge, Dock and Foundation Piles

BRANCHES:

NEW ORLEANS, LA.
ROBERT, LA.



2464 S. Loomis Street

Main Office and Yard:

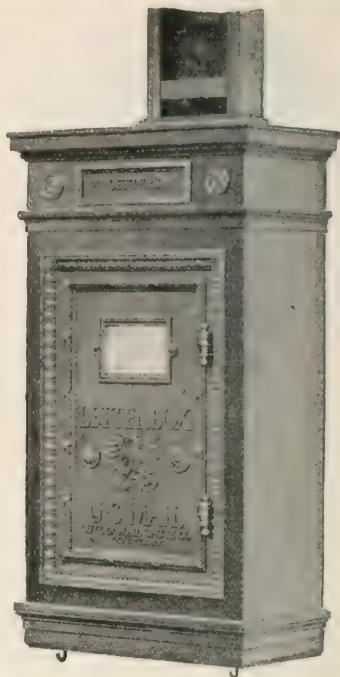
CHICAGO, ILL.

Telephone Canal 0861

THE CUTLER MAIL CHUTE

In order to meet the requirements of the Regulations of the Post Office Department as to location and arrangement, the matter should be taken up early, thus avoiding changes which might otherwise become necessary. Full details and information on request.

CUTLER MAIL CHUTE CO.
GENERAL OFFICES AND FACTORY
ROCHESTER, N.Y.



Stock Mail Box Design 4165

VARIETY FIRE DOOR COMPANY

*Steel Fire Doors, Hollow Metal Doors
Rolling Steel Shutters, Tin Clad Fire
Doors, Cross Horizontal Folding Doors
Freight Elevator Doors, Saino Doors
Underwriters Labelled Doors*

CARROLL and SACRAMENTO AVES.
CHICAGO, ILLINOIS

Phone Kedzie 3434

UNION FOUNDRY WORKS

General Office
1454 First National
Bank Building

Works
7610 to 7628
Greenwood Ave.

Structural and Ornamental **IRON WORK**

A Large Stock of Structural
Steel Shapes on Hand

Office Phone, Randolph 3663 and 3664
Works Phone, Triangle 7277 and 7278

Frederick Voss Company

NOT INC.

Manufacturers of

*Fire Proof Wire Lathing
and Wire Cloth and Metal
Furring for all purposes*

ARCHITECTS will serve the best interests of their clients by specifying Voss
Wire Lath for plastering—either plain, painted or galvanized.

We recommend 18 gauge

*Always Specify No. 18 Washburn & Moen Gauge .0475 $\frac{3}{8}$ " Mesh Wire Lath. In
calling for Voss Lath you get this gauge and mesh*

Voss Wire Lath has been used in the Palmer House, Morrison Hotel, John B. Murphy Memorial,
St. Lukes Hospital, Hotel Sherman, Stevens Hotel, 333 N. Michigan Building
Penobscot Building, Detroit, Chicago Evening Post
Palmolive Building, Chicago Daily News Building

552-554 West Monroe Street

Franklin 2280

CHICAGO



Shoreland Hotel, Chicago

Meyer J. Fridstein, Engineer

The Janows & Kramer Co. are Designers and Manufacturers of Complete Kitchen and Refrigerator Equipment for Hotels, Hospitals, Clubs, Restaurants, Schools and Institutions.

We will furnish the Architect upon request with plans and specifications covering complete kitchen requirements. No charge is made for this service.

JANOWS & KRAMER CO., 1637-1645 Carroll Ave., Chicago, Ill.

Recent Installations

R. R. Donnelley & Sons Co.,
Chicago

Shoreland Hotel, Chicago

Hotel Sherman, Chicago

Southmoor Hotel, Chicago

Orrington Hotel, Evanston

Graemere Hotel, Chicago

Ontra Cafeterias (3),
Chicago

Scottish Rites Cathedral,
New Castle

Y. W. C. A., St. Joseph,
Mich.

Ohio State University,
Pomerene Hall

Montgomery Ward & Co.,
Chicago

Phone Wabash 2020

NIC. KALTEUX

Contractor

ARTIFICIAL MARBLE SCAGLIOLA



CONSUMERS BLDG.
220 South State Street
CHICAGO

Phone Haymarket 3704

LOUIS BIEGLER COMPANY

MANUFACTURERS OF

**FIREPROOF METAL WINDOWS
ART METAL DOORS
SHEET METALWORK**

165-171 N. CURTIS STREET
CHICAGO



THEY CANNOT COME APART

**Koll's Lock-Joint
Patent Wood Columns**

**COLONIAL
ENTRANCES**

Special Millwork

PERGOLAS, GARDEN ACCESSORIES

Exterior and Interior Columns Catalog No. 48
Colonial Entrance " No. 53
Garden Accessories " No. 39



Factory and Main Office:

2155-87 Elston Ave., Chicago, Ill.

Telephone Brunswick 2868

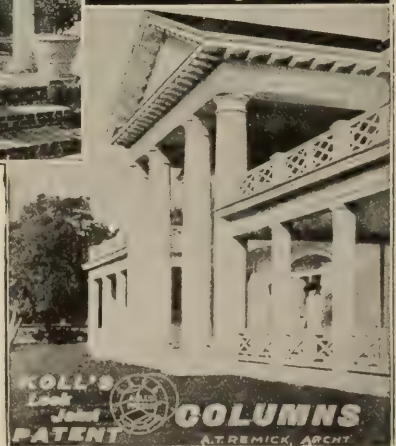
New York City Office: 6 East 39th Street

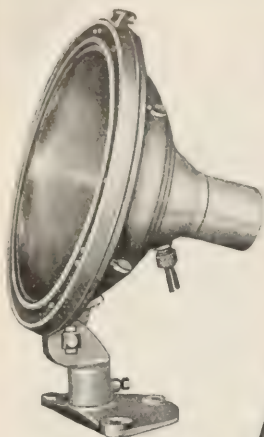
Hartmann - Sanders Co.

SOLE MANUFACTURERS



PERGOLAS AND HOMES
PROVIDED WITH
Columns of Quality

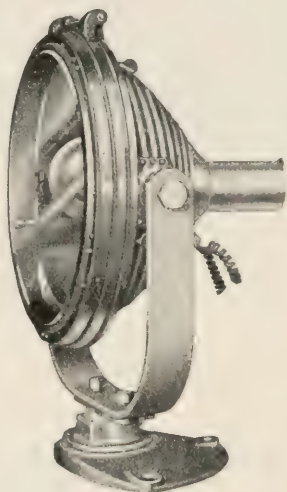




For Any Problem of
General Outdoor
Lighting

USE

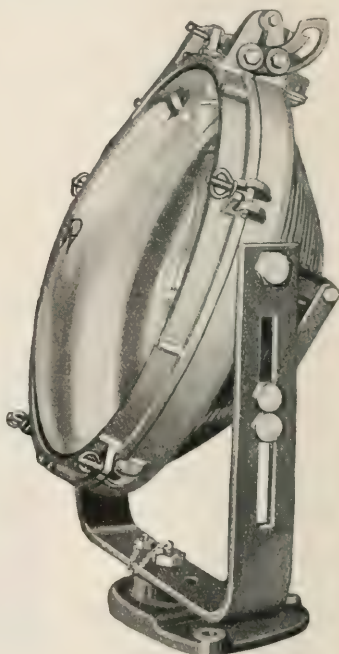
Pyle-O-Light
Projectors



Best in
Design—
Construction—
Performance



Send for Descriptive Bulletins



The PYLE-NATIONAL COMPANY

General Offices and Works: 1334-1358 North Kostner Avenue

CHICAGO, ILLINOIS, U. S. A.

**EXPORT
DEPARTMENT**
International Railway
Supply Co.
30 Church Street
New York City

BRANCH OFFICES
3509 Grand Central Terminal, New York City
815 Boatmen's Bank Bldg., St. Louis, Missouri
311 Builders Exchange Bldg., St. Paul, Minnesota
2241 Oliver Bldg., Pittsburgh, Pennsylvania
716-718 Little Bldg., Boston, Massachusetts
1000 Marine Bank Bldg., Houston, Texas

**CANADIAN
AGENTS**
The Holden Company,
Ltd.
Montreal, Toronto
Winnipeg, Vancouver

MISCELLANEOUS AND USEFUL INFORMATION CONCERNING BUILDING ENGINEERING, TRADES AND MATERIALS.

The following pages contain tables, formulae, and miscellaneous information intended to be of assistance to architects in the preparation of plans, specifications, estimates, and the general supervision of the construction work. In order to make the classification simple and to follow a uniform system this matter is classified according to the Dewey System, see page 751, and the file or classification numbers are printed in small type at the head of each piece of matter falling under a different classification. As far as possible the names of authorities quoted are given but in some cases this has been impossible.

RULES AND FORMULAS FOR THE DESIGN OF SIMPLE WOOD BEAMS OR JOISTS.

When a beam is to be designed its length and the loads to which it is to be subjected are known, thus the maximum bending moment may be found.

The allowable-working-strength is assumed in accordance with engineering practice and must not be more than allowed by building laws, locally applicable. This allowable-working-strength is usually stated in municipal codes as a fixed number of pounds per square inch of cross sectional area, for each kind of material. This might just as well be stated in tons or any other unit of weight per square foot or any other unit of area, it being only important that whatever unit of dimension is used that the same unit shall be used both for areas, lengths and breadths.

Breadth-of-the-beam times the-square-of-the-depth divided by six equals Bending-Moment divided by allowable-working-strength per unit of area corresponding with unit of length used for stating the length and breadth of beam.

Bending-Moment (for beams uniformly loaded) equals weight-to-be-supported-per-unit-of-length times the-square-of-the-total-number-of-units-of-length divided by eight.

For a simple beam loaded with a single weight, the maximum-Bending-Moment (which is to be used in formula) equals the-entire-load times [(the-length-of-the-beam) minus (the-distance-of-the-load-from-the-left-hand-end)] times the-distance-of-the-load-from-the-left-hand-end-of-the-beam divided by the-length-of-the-beam.

If the load be movable the-distance-of-load-from-left-hand-end will be variable and the maximum-moment will be developed when the load is at the middle where the maximum-Bending-Moment is equal to one-fourth-the-load times the-length-of-the-beam. Placing the entire load on a beam at its center therefore produces the maximum strain that it is possible to produce on such beam by any position of such load.

APPLICATION OF ABOVE PRINCIPLES.

M=maximum bending moment.

S=the tensile or compressive unit stress per square inch allowable by building code or engineering practice for the material selected (See Section 539, Chicago Municipal Code, using the smallest value where there is a difference between compression and tension strength.)

l=length in inches of beam between supports.

b=breadth in inches of the beam.

d=depth in inches of the beam.

w=weight in pounds on beam including the weight of the beam itself per each inch of length.

W=total weight in pounds on beam = l w.

FOR UNIFORM LOADING.

$$b = \frac{3 w l^2}{4 d^2 S} = \frac{3 W l}{4 d^2 S} \text{ breadth of beam.}$$

$$d = \frac{\sqrt{3 w l^2}}{\sqrt{4 b S}} = \frac{\sqrt{3 W l}}{\sqrt{4 b S}} \text{ depth of beam}$$

To find b it is necessary to assume a value for d. Also to find d it is necessary to assume a value for b. In case it is found that the value by formula is too large or too small for practical use, then assumed value must be changed so as to bring the computed value to a practical size.

SAFE STRENGTH OF CONCENTRICALLY AND ECCENTRICALLY LOADED REINFORCED CONCRETE COLUMNS

Benj. E. Winslow, A. I. A., I. S. A., Architectural Engineer, Mem. Am. Soc. C. E.

Copyright, 1922, by H. L. Palmer

NOTATION

A —Total core area in square inches required to take care of a direct load and a moment.

A_1 —Area in square inches required to take care of concentric load only.

A_2 —Area in square inches required to take care of the bending moment only.

P_1 —Total concentric load on column in pounds.

P_2 —Total eccentric load on column in pounds.

P —Total equivalent concentric load on column in pounds, or the concentric load which will produce the same maximum stress on the column as the eccentric load P_2 .

M —Bending moment on section in inch pounds= P_2e .

$C_s=A$ Constant= $2\left(\frac{y}{r}\right)^2$

E_1 —Modulus of elasticity of steel.

E_2 —Modulus of elasticity of concrete.

S_2 —Section modulus.

I —Moment of inertia of cross section.

r —Radius of gyration of cross section.

d' —Outer diameter or side of steel reinforcement in inches.

d_2 —Inner diameter or side of steel reinforcement in inches.

a —Constant in moment of inertia formula $I=ad^4$.

b —Width or breadth of rectangular column in inches.

d —Core diameter in inches of hooped reinforced concrete column or side of square tied reinforced concrete column.

e —Eccentricity of load P_2 in inches.

f —Average stress in pounds per square inch on entire column section.

f_1 —Allowable safe compressive stress as given by the Chicago Building Ordinance, on plain concrete.

f_2 —Stress on extreme fibre in lbs. per square inch due to the moment on the section caused by the eccentric load.

k —Ratio $\frac{f_2}{f}$

m —Constant in radius of gyration formula $r=md$.

n_1 —Constant in section modulus formula $S=n_1d^3$.

p —percentage of vertical steel in column.

p_1 —percentage of hooping steel in column.

n —Ratio $\frac{E_1}{E_2}$

m_1 —Constant for the area of a cross section $A=m_1d^2$.

For all reinforced concrete columns.

$P_1=A_1f$ (1) when the value (f) varies with the type of the column used and with the reinforcement.

For tied square or rectangular reinforced concrete columns

$$f=f_1\left(1+\frac{p}{100}(n-1)\right) \dots \dots (2)$$

Introducing in (2) the ordinance values (2) becomes

for 1 : 2 : 4 Concrete : $f=400(1+0.14p)$ (3)

for 1 : 1½ : 3 Concrete : $f=480(1+0.11p)$ (4)

for 1 : 1 : 2 Concrete : $f=580(1+0.09p)$ (5)

the result of which is given in table (1).

For reinforced concrete hooped columns the Chicago Ordinance requirements leads to the following formula:

$$f=f_1\left(1+\frac{p}{100}(n-1)\right)\left(1+2.5n\frac{p_1}{100}\right) \dots (6)$$

Introducing the ordinance values (6) becomes

for 1 : 2 : 4 concrete: $f=500(1+0.14p)$ (1+0.375 p_1) (7)

for 1 : 1½ : 3 concrete: $f=600(1+0.11p)$ (1+0.300 p_1) (8)

for 1 : 1 : 2 concrete: $f=725(1+0.09p)$ (1+0.25 p_1) (9)

the result of which is given in table (2).

Tables (1) and (2) give the strength of columns for concentric loads only. By help of the method given in the following, they can also be used for eccentric loads:

The direct compressive stress in a short concentrically loaded column is:

$$f=\frac{P_1}{A_1} \dots \dots \dots (10)$$

for which the cross sectional area required to take care of the concentric load is

$$A_1=\left(\frac{P_1}{f}\right) \dots \dots \dots (11)$$

When the column load is eccentric, the effect of such a load on the column is the same as the combined effect of

1.) A concentric load $P_1=P_2$

2.) A moment equal to $P_2 \times e=M$.

The effect of the concentric load is given by (10) and (11) and the extreme fibre stress due to a moment acting on a section of either a column or a beam, is according to the common theory of flexure:

$$f_2=\frac{M}{S_2}=\frac{P_2e}{S_2} \dots \dots \dots (12)$$

The safe allowable bending stress f_2 is often taken at a different value than the safe allowable compressive stress f . Calling the ratio

$$\frac{f_2}{f}=k \dots \dots \dots (13)$$

we obtain from (12)

$$kf=\frac{P_2e}{S_2} \dots \dots \dots (14)$$

multiply both sides of the equation with the area A_2

$$A_2kf=\frac{A_2P_2e}{S_2} \dots \dots \dots (15)$$

from which we have

$$A_2=\frac{P_2e}{f k S_2} \dots \dots \dots (16)$$

The ratio

$$\frac{A_2}{S_2}=\frac{A_2}{I}=\frac{A_2y}{I}=\frac{A_2y}{A_2r^2}=\frac{y}{r^2} \dots (17)$$

It will also be noted that $\frac{A_2}{S_2} \times d=m$

$$\frac{A_2d}{S_2}=\frac{m'd^3}{n'd^3}=\frac{m^1}{n^1}$$

This ratio is thus seen to be a ratio which is dependent upon the shape of this section only and not at all upon the area A_2 . It can therefore be applied to any area whatever as long as the shape of this section is the same.

Introducing (17) in (16) and multiplying both numerator and denominator with (d) we obtain after reduction

$$A_2=\frac{P_2}{f k} \frac{1}{2} \frac{y^2}{r^2} \frac{e}{d} \dots \dots \dots (18)$$

which when constant $C=2\left(\frac{y}{r}\right)^2$ is introduced, becomes

$$A_2=\frac{P_2 C e}{f k d} \dots \dots \dots (19)$$

The total column area required to take care of the concentric load as well as the moment is

$$A=A_1+A_2 \dots \dots \dots (7)$$

$$\dots \dots \dots (8)$$

$$\dots \dots \dots (9)$$

Allowable Safe Unit Compression Stress (f) for Tied Reinforced Concrete Columns.

Table 1.

Per Cent of Vert. Steel	Table of f			Per Cent of Vert. Steel	Table of f			Per Cent of Vert. Steel	Table of f		
	n=15 1:2:4	n=12 1:1½:3	n=10 1:1:2		n=15 1:2:4	n=12 1:1½:3	n=10 1:1:2		n=15 1:2:4	n=12 1:1½:3	n=10 1:1:2
0	400	480	580	1.4	478	554	653	2.4	534	607	705
0.5	428	506	606	1.5	484	559	658	2.5	540	612	710
0.6	434	512	611	1.6	490	564	664	2.6	546	617	716
0.7	439	517	617	1.7	495	570	669	2.7	551	623	721
0.8	445	523	622	1.8	501	575	674	2.8	557	628	726
0.9	450	528	627	1.9	506	580	679	2.9	562	633	731
1.0	456	533	632	2.0	512	586	684	3.0	568	638	737
1.1	462	538	637	2.1	518	591	690	.....	.....	.....	.....
1.2	467	543	643	2.2	523	596	695	.....	.....	.....	.....
1.3	473	549	648	2.3	529	601	700	.....	.....	.....	.....

$A=A_1+A_2$ (20)
Introducing in (20) the volume found in
(11) and (19) we have

$$A = \frac{P_2}{f} + \frac{P_2 C e}{f k d} \quad (21)$$

or $A = \frac{P_2}{f} \left(1 + \frac{C e}{k d} \right)$ (22)

and finally $Af = P = P_2 \left(1 + \frac{C e}{k d} \right)$ (23)

where $Af = P =$ the equivalent concentric load on the column which produces the same stress on the section as the eccentric load P_2 .

Eccentrically loaded columns can therefore be figured same as concentrically loaded columns simply substituting the equivalent load P for the actual eccentric load P_2 .

The difficulty in doing this simply consists in obtaining the value of (C). It will be seen from the above that no error whatsoever is made by obtaining the value (C) from the final column section (A) instead of from the moment section A_2 . This has therefore been done, and the properties worked out for the final column section A. The properties for the reinforced concrete sections have been obtained by multiplying the steel areas by (n-1) and by finding the properties of the equivalent section in the standard manner, assuming that for round columns the steel area would form a ring of the same area as the steel reinforcing, and for square columns that the steel area would form a hollow square of the same area as the steel reinforcing, the thickness depending upon the percentage of reinforcing in the column.

It will be too long here to give the mathematics for this. However the resulting formula for the section modulus of the column section was found to be as follows:

for □ Cols. $S = 0.1667d^3 \left\{ (n-1) \left(\frac{d_1^4 - d_2^4}{d_1} \right) + 1 \right\}$ (24)

for ○ Cols. $S = 0.0982d^3 \left\{ (n-1) \left(\frac{d_1^4 - d_2^4}{d_1} \right) + 1 \right\}$ (25)

By help of table (3) the equivalent concentric load can be found from formula (23) for any case whatsoever. This value can be found for any value of (k). When $k=1$, or when the allowable bending and compression stress are equal, $\frac{C}{k}$ becomes $=C$.

In the Chicago Ordinance the ratio $k = \frac{700}{400} = 1.75$, and this value has therefore been used in table (3) for the value $\frac{C}{k}$.

When many columns have to be figured it is somewhat cumbersome to solve (23) for each case. The author has therefore attempted to solve all cases once for all in tables (4) and (5).

From (23) we obtain direct

$$\text{Ratio } \frac{P_2}{P} = \frac{1}{1 + \frac{C e}{k d}} \quad (26)$$

which gives the ratio of the equivalent concentric load to the actual eccentric load. Tables (4) and (5) give this ratio expressed in percentages of the strength of that of a concentrically loaded column. The concrete for all columns given in Tables (4) and (5) is assumed to be of a 1 : 1 : 2 mixture. For other mixtures of Concrete the percentage value will be slightly increased. Their exact value can be obtained from table (3) and formula (23).

Tables (4) and (5) show at a glance the weakening effect of applying a load with a given eccentricity. The value in this table for a concentric load will in all cases be 100. The difference between 100 and the percentage given in the tables represents the weakening effect due to the eccentricity.

It has been assumed in this analysis that the neutral axis of the section in all cases would go through the center of gravity of the section. This is in conformity with the common theory of flexure. This assumption only holds good as long as there is no actual tension in the concrete. There will be no actual tension in the concrete as long as

$$\frac{C e}{k d} < 1 \quad (25)$$

that is as long as the percentages given in tables (4) and (5) are above 50%. It will be noticed that in these tables there are no values below 50, which means that in all cases actual compression will exist over the entire column section.

When actual tension is developed on one

side of the column section the neutral axis will move away from the center of gravity of the column section, as the concrete is unfitted to resist tensile stresses. The method of obtaining the properties of the column section under these circumstances become very complicated indeed.

It is fortunate, however, that most cases of eccentrically loaded columns which occur in actual practice will come inside of the range of tables (4) and (5).

In monolytic, reinforced concrete construction there is more or less uncertainty with respect to the eccentricity of the load. For this reason tables (4) and (5) have been made, so that they can be used for any probable eccentricity.

In monolytic reinforced concrete construction the moment found at any rigid joint will divide itself between all of the members

Table 2.
Allowable Safe Unit Compressive Stress on Core-Area of Reinforced Concrete Hooped Columns in Accordance with the Chicago Building Ordinance Requirements. Total Safe Load $W = Af$ —Value of f . (Top Line only.) Values Obtained from Formulas 7, 8 and 9.

Percentages of Hooping Steel	Mix of Concrete	540	660	650	700	72½	74½	760	780	800	820	840	860	880	900	920	940	960	980	1000	1020	1040	1060	1080	1100
0.5%	1:2 :4	0.56	0.80	1.04	1.28	1.52	1.76	2.00	2.24	2.48	2.72	2.96	3.20	3.44	3.68	3.92	4.17	4.41	4.65	4.89	5.13	5.37	5.60	5.85	6.09
	1:1½ :3				0.66	0.90	1.14	1.38	1.62	1.86	2.10	2.34	2.58	2.82	3.06	3.30	3.54	3.78	4.02	4.26	4.50	4.74	4.98	5.22	5.46
	1:1 :2																								
0.6	1:2 :4			0.79	1.02	1.25	1.49	1.72	1.95	2.19	2.42	2.65	2.89	3.12	3.35	3.59	3.82	4.05	4.29	4.52	4.75	4.99	5.22	5.45	5.69
	1:1½ :3						0.67	0.92	1.18	1.44	1.69	1.95	2.21	2.47	2.73	2.98	3.24	3.49	3.75	4.01	4.26	4.52	4.78	5.03	5.29
	1:1 :2																								
0.7%	1:2 :4				0.78	1.00	1.23	1.46	1.68	1.91	2.14	2.36	2.59	2.81	3.04	3.27	3.49	3.72	3.95	4.17	4.40	4.63	4.85	5.08	5.30
	1:1½ :3					0.93	1.18	1.43	1.68	1.93	2.18	2.43	2.68	2.93	3.18	3.43	3.68	3.93	4.18	4.43	4.68	4.93	5.18	5.43	5.68
	1:1 :2																								
0.75	1:2 :4					0.89	1.11	1.33	1.55	1.78	2.00	2.22	2.45	2.67	2.89	3.12	3.34	3.56	3.78	4.01	4.23	4.45	4.68	4.90	5.12
	1:1½ :3						0.80	1.05	1.30	1.55	1.79	2.04	2.29	2.54	2.79	3.03	3.28	3.53	3.77	4.02	4.27	4.52	4.77	5.02	5.27
	1:1 :2																								
0.8	1:2 :4					0.99	1.21	1.43	1.65	1.87	2.09	2.31	2.53	2.75	2.97	3.19	3.41	3.63	3.85	4.07	4.29	4.51	4.73	4.95	5.17
	1:1½ :3						0.93	1.17	1.42	1.66	1.91	2.15	2.40	2.64	2.88	3.13	3.37	3.62	3.86	4.11	4.35	4.59	4.83	5.07	5.31
	1:1 :2																								
0.9	1:2 :4						0.97	1.19	1.40	1.62	1.83	2.04	2.26	2.47	2.67	2.88	3.09	3.31	3.52	3.74	3.95	4.18	4.39	4.61	4.83
	1:1½ :3										0.93	1.17	1.41	1.65	1.89	2.13	2.37	2.61	2.85	3.09	3.33	3.57	3.81	4.05	4.29
	1:1 :2																								
1.0	1:2 :4									1.17	1.38	1.58	1.79	2.00	2.21	2.42	2.62	2.83	3.04	3.25	3.45	3.66	3.87	4.08	4.29
	1:1½ :3																								
	1:1 :2																								
1.1	1:2 :4										1.15	1.35	1.55	1.76	1.96	2.16	2.36	2.57	2.77	2.97	3.17	3.38	3.58	3.78	3.98
	1:1½ :3																								
	1:1 :2																								
1.2	1:2 :4																								
	1:1½ :3																								
	1:1 :2																								
1.25	1:2 :4																								
	1:1½ :3																								
	1:1 :2																								
1.3	1:2 :4																								
	1:1½ :3																								
	1:1 :2																								
1.4	1:2 :4																								
	1:1½ :3																								
	1:1 :2																								
1.5	1:2 :4																								
	1:1½ :3																								
	1:1 :2																								

NOTE—Figures below top line give percentages of vertical steel in hooped reinforced concrete columns only.

Allowable Safe Unit Compressive Stress on Core-Area of Reinforced Concrete Hooped Columns. (Continued.)

Percentages of Hooping Steel	Mix of Concrete	1120	1140	1160	1180	1200	1220	1240	1260	1300	1320	1340	1360	1380	1400	1420	1440	1460	1480	1500	1540	1580	1620	1660				
		1:2 .4 1:1 1/2:3 1:1 1/2	6.33 5.67 4.15	6.57 5.93 4.42	6.81 6.19 4.69	7.05 6.46 4.96	7.29 6.72 5.24	7.53 6.98 5.51	7.77 7.25 5.75	8.02 7.51 6.03	8.27 7.75 6.27	8.52 8.04 6.56	8.77 8.29 6.81	9.02 8.54 7.06	9.27 8.79 7.31	9.52 9.04 7.56	9.77 9.29 7.81	10.02 9.54 8.06	10.27 9.79 8.31	10.52 10.04 8.56	10.77 10.29 8.81	11.02 10.54 9.06	11.27 10.79 9.31	11.52 11.04 9.56				
0.5%	1:2 .4 1:1 1/2:3 1:1 1/2	5.92 5.29 3.81	6.15 5.55 4.08	6.38 5.78 4.35	6.62 6.06 4.61	6.85 6.30 4.88	7.08 6.57 5.15	7.32 6.83 5.41	7.55 7.09 5.67	7.78 7.34 5.92	8.02 7.60 6.21	8.27 7.86 6.47	8.52 8.11 6.72	8.77 8.36 6.97	9.02 8.61 7.22	9.27 8.86 7.47	9.52 9.11 7.72	9.77 9.36 7.97	10.02 9.61 8.22	10.27 9.86 8.47	10.52 10.11 8.72	10.77 10.36 8.97	11.02 10.61 9.22	11.27 10.86 9.47				
	1:2 .4 1:1 1/2:3 1:1 1/2	5.53 4.93 3.50	5.76 5.18 3.76	5.98 5.43 4.02	6.21 5.68 4.28	6.44 5.94 4.54	6.66 6.19 4.80	6.89 6.44 5.06	7.11 6.69 5.32	7.34 6.94 5.58	7.57 7.19 5.85	7.80 7.41 6.11	8.02 7.63 6.33	8.27 7.88 6.58	8.52 8.13 6.83	8.77 8.38 7.08	9.02 8.63 7.33	9.27 8.88 7.58	9.52 9.13 7.83	9.77 9.38 8.08	10.02 9.63 8.33	10.27 9.88 8.58	10.52 10.13 8.83					
	1:2 .4 1:1 1/2:3 1:1 1/2	5.16 4.59 3.19	5.38 4.84 3.43	5.60 5.08 3.65	5.82 5.33 3.96	6.04 5.57 4.23	6.26 5.82 4.47	6.48 6.06 4.73	6.70 6.31 4.98	6.92 6.55 5.24	7.14 6.79 5.49	7.36 7.04 5.74	7.58 7.28 5.98	7.80 7.53 6.23	8.02 7.77 6.47	8.27 7.97 6.67	8.52 8.22 6.92	8.77 8.47 7.17	9.02 8.72 7.42	9.27 8.97 7.67	9.52 9.22 7.92	9.77 9.47 8.17	10.02 9.72 8.42	10.27 9.97 8.67				
0.6%	1:2 .4 1:1 1/2:3 1:1 1/2	4.82 4.27 2.90	5.03 4.51 3.13	5.25 4.75 3.40	5.46 4.99 3.63	5.67 5.23 3.90	5.89 5.46 4.15	6.10 5.70 4.40	6.32 5.94 4.63	6.53 6.18 4.90	6.74 6.42 5.15	6.96 6.66 5.40	7.17 6.89 5.63	7.38 7.13 5.88	7.59 7.37 6.11	7.80 7.59 6.33	8.02 7.82 6.56	8.27 8.07 6.81	8.52 8.32 7.06	8.77 8.57 7.31	9.02 8.82 7.56	9.27 9.07 7.81	9.52 9.32 8.06					
	1:2 .4 1:1 1/2:3 1:1 1/2	4.49 3.96 2.62	4.70 4.20 2.87	4.91 4.43 3.11	5.12 4.68 3.36	5.33 4.90 3.60	5.53 5.13 3.85	5.74 5.36 4.09	5.95 5.59 4.34	6.16 5.83 4.58	6.37 6.06 4.83	6.57 6.29 5.07	6.78 6.53 5.32	6.99 6.76 5.56	7.20 6.99 5.79	7.41 7.23 6.03	7.62 7.46 6.26	7.83 7.69 6.49	8.04 7.93 6.73	8.25 8.10 6.90	8.46 8.31 7.11	8.67 8.52 7.32	8.88 8.73 7.53					
	1:2 .4 1:1 1/2:3 1:1 1/2	4.18 3.67 2.35	4.39 3.94 2.59	4.59 4.16 2.83	4.79 4.38 3.07	4.99 4.61 3.31	5.20 4.81 3.55	5.40 5.04 3.79	5.60 5.26 4.03	5.80 5.49 4.27	6.00 5.72 4.52	6.21 5.95 4.76	6.41 6.17 5.00	6.61 6.40 5.24	6.82 6.63 5.48	7.02 6.86 5.72	7.23 7.09 5.96	7.44 7.31 6.20	7.65 7.51 6.40	7.86 7.77 6.68	8.07 7.98 6.92	8.28 8.19 7.08	8.49 8.40 7.38					
0.7%	1:2 .4 1:1 1/2:3 1:1 1/2	3.89 3.39 2.09	4.09 3.61 2.33	4.29 3.89 2.56	4.48 4.08 2.80	4.68 4.30 3.04	4.88 4.50 3.27	5.07 4.72 3.51	5.27 4.95 3.74	5.47 5.17 3.98	5.67 5.39 4.21	5.87 5.62 4.45	6.06 5.84 4.69	6.26 6.06 4.92	6.45 6.28 5.16	6.65 6.51 5.39	6.85 6.73 5.63	7.05 6.95 5.87	7.24 7.17 6.10	7.44 7.40 6.34	7.64 7.62 6.57	7.84 7.84 6.87						
	1:2 .4 1:1 1/2:3 1:1 1/2	3.75 3.25 1.97	3.95 3.49 2.20	4.14 3.74 2.43	4.34 3.94 2.67	4.54 4.16 2.90	4.72 4.35 3.13	4.92 4.57 3.37	5.11 4.79 3.60	5.31 5.01 3.83	5.50 5.23 4.07	5.69 5.45 4.30	5.88 5.67 4.53	6.06 5.85 4.72	6.25 6.09 4.97	6.44 6.34 5.23	6.63 6.55 5.47	6.82 6.78 5.70	7.01 6.95 5.93	7.21 7.22 6.17	7.41 7.44 6.40	7.61 7.64 6.64	7.81 7.88 6.87					
	1:2 .4 1:1 1/2:3 1:1 1/2	3.61 3.13 1.84	3.80 3.34 2.07	3.99 3.57 2.31	4.19 3.77 2.54	4.38 3.99 2.77	4.57 4.21 3.00	4.76 4.43 3.23	4.96 4.64 3.46	5.15 4.86 3.69	5.34 5.08 3.93	5.53 5.30 4.16	5.72 5.52 4.39	5.92 5.73 4.62	6.11 5.92 4.85	6.30 6.17 5.08	6.49 6.36 5.31	6.68 6.61 5.54	6.88 6.82 5.78	7.07 7.04 6.01	7.26 7.26 6.24	7.45 7.44 6.42	7.64 7.68 6.67					
0.8%	1:2 .4 1:1 1/2:3 1:1 1/2	3.35 2.86 1.60	3.54 3.07 1.83	3.72 3.29 2.06	3.91 3.50 2.29	4.10 3.71 2.51	4.29 3.93 2.74	4.47 4.14 2.97	4.66 4.35 3.19	4.85 4.57 3.42	5.04 4.78 3.65	5.23 5.02 3.88	5.41 5.21 4.10	5.60 5.42 4.33	5.78 5.65 4.56	5.97 5.85 4.78	6.16 6.06 5.01	6.35 6.35 5.24	6.53 6.47 5.46	6.72 6.72 5.69	6.91 6.91 5.92	7.10 7.10 6.08	7.29 7.34 6.37					
	1:2 .4 1:1 1/2:3 1:1 1/2	3.10 2.61 1.37	3.28 2.82 1.60	3.46 3.03 1.82	3.65 3.24 2.04	3.83 3.44 2.26	4.01 3.66 2.49	4.19 3.87 2.71	4.38 4.08 2.93	4.56 4.28 3.16	4.74 4.49 3.38	4.93 4.73 3.60	5.11 4.93 3.82	5.29 5.12 4.05	5.47 5.34 4.27	5.66 5.54 4.49	5.84 5.84 4.72	6.02 5.96 4.94	6.21 6.16 5.16	6.39 6.46 5.39	6.57 6.67 5.61	6.76 7.00 6.05	6.94 7.04 6.05					
	1:2 .4 1:1 1/2:3 1:1 1/2	2.91 2.43 1.19	3.09 2.63 1.39	3.27 2.81 1.59	3.45 3.03 1.79	3.63 3.24 1.99	3.81 3.44 1.81	3.99 3.64 1.71	4.17 3.84 1.69	4.35 4.03 1.61	4.53 4.23 1.57	4.71 4.43 1.53	4.89 4.62 1.50	5.07 4.81 1.47	5.25 5.00 1.44	5.43 5.19 1.41	5.61 5.39 1.38	5.79 5.59 1.35	5.97 5.79 1.32	6.15 6.00 1.29	6.33 6.18 1.26	6.51 6.38 1.23	6.69 6.56 1.20	6.87 6.75 1.17				
0.9%	1:2 .4 1:1 1/2:3 1:1 1/2	2.72 2.26 1.04	2.89 2.44 1.16	3.06 2.62 1.12	3.23 2.81 1.18	3.40 3.00 1.14	3.57 3.19 1.10	3.74 3.38 1.07	3.91 3.56 1.04	4.08 3.74 1.01	4.25 3.92 0.98	4.42 4.09 0.95	4.59 4.27 0.92	4.76 4.45 0.89	4.93 4.63 0.86	5.10 4.81 0.83	5.27 4.99 0.80	5.44 5.17 0.77	5.61 5.36 0.74	5.78 5.54 0.71	5.95 5.72 0.68	6.12 5.90 0.65	6.29 6.08 0.62	6.46 6.26 0.59				
	1:2 .4 1:1 1/2:3 1:1 1/2	2.54 2.09 0.92	2.71 2.27 0.99	2.88 2.45 0.96	3.05 2.64 0.93	3.22 2.83 0.90	3.39 3.02 0.87	3.56 3.20 0.84	3.73 3.39 0.81	3.90 3.57 0.78	4.07 3.75 0.75	4.24 3.93 0.72	4.41 4.11 0.69	4.58 4.29 0.66	4.75 4.47 0.63	4.92 4.65 0.60	5.09 4.83 0.57	5.26 5.02 0.54	5.43 5.20 0.51	5.60 5.39 0.48	5.77 5.57 0.45	5.94 5.76 0.42	6.11 5.93 0.39	6.28 6.11 0.36				
	1:2 .4 1:1 1/2:3 1:1 1/2	2.36 1.92 0.80	2.53 2.10 0.87	2.70 2.28 0.84	2.87 2.46 0.81	3.04 2.65 0.78	3.21 2.83 0.75	3.38 3.02 0.72	3.55 3.20 0.69	3.72 3.39 0.66	3.89 3.57 0.63	4.06 3.75 0.60	4.23 3.93 0.57	4.40 4.11 0.54	4.57 4.29 0.51	4.74 4.47 0.48	4.91 4.65 0.45	5.08 4.83 0.42	5.25 5.02 0.39	5.42 5.20 0.36	5.59 5.39 0.33	5.76 5.58 0.30	5.93 5.76 0.27	6.10 5.93 0.24	6.27 6.11 0.21			
1.0%	1:2 .4 1:1 1/2:3 1:1 1/2	2.18 1.75 0.73	2.35 1.93 0.79	2.52 2.11 0.76	2.69 2.29 0.73	2.86 2.47 0.70	3.03 2.65 0.67	3.20 2.83 0.64	3.37 3.02 0.61	3.54 3.20 0.58	3.71 3.38 0.55	3.88 3.56 0.52	4.05 3.74 0.49	4.22 3.93 0.46	4.39 4.10 0.43	4.56 4.28 0.40	4.73 4.47 0.37	4.90 4.64 0.34	5.07 4.83 0.31	5.24 5.01 0.28	5.41 5.20 0.25	5.58 5.39 0.22	5.75 5.58 0.19	5.92 5.76 0.16	6.09 5.93 0.13			
	1:2 .4 1:1 1/2:3 1:1 1/2	2.00 1.58 0.60	2.17 1.76 0.76	2.34 1.94 0.73	2.51 2.12 0.70	2.68 2.29 0.67	2.85 2.47 0.64	3.02 2.65 0.61	3.19 2.83 0.58	3.36 3.02 0.55	3.53 3.20 0.52	3.70 3.38 0.49	3.87 3.57 0.46	4.04 3.76 0.43	4.21 3.94 0.40	4.38 4.12 0.37	4.55 4.30 0.34	4.72 4.48 0.31	4.89 4.66 0.28	5.06 4.84 0.25	5.23 5.03 0.22	5.40 5.22 0.19	5.57 5.40 0.16	5.74 5.58 0.13	5.91 5.76 0.10			
	1:2 .4 1:1 1/2:3 1:1 1/2	1.82 1.41 0.53	1.99 1.60 0.60	2.16 1.77 0.57	2.33 1.95 0.54	2.50 2.12 0.51	2.67 2.29 0.48	2.84 2.47 0.45	3.01 2.65 0.42	3.18 2.83 0.39	3.35 3.02 0.36	3.52 3.20 0.33	3.69 3.40 0.30	3.86 3.58 0.27	4.03 3.77 0.24	4.20 3.95 0.21	4.37 4.13 0.18	4.54 4.31 0.15	4.71 4.49 0.12	4.88 4.67 0.09	5.05 4.85 0.06	5.22 5.04 0.03	5.39 5.22 0.00	5.56 5.40 0.00	5.73 5.58 0.00	5.90 5.76 0.00		
1.1%	1:2 .4 1:1 1/2:3 1:1 1/2	1.64 1.24 0.45	1.81 1.43 0.46	1.98 1.60 0.43	2.15 1.77 0.40	2.32 1.95 0.37	2.49 2.12 0.34	2.66 2.30 0.31	2.83 2.47 0.28	3.00 2.65 0.25	3.17 2.83 0.22	3.34 3.02 0.19	3.51 3.20 0.16	3.68 3.40 0.13	3.85 3.58 0.10	4.02 3.77 0.07	4.19 3.95 0.04	4.36 4.13 0.01	4.53 4.31 0.00	4.70 4.49 0.00	4.87 4.67 0.00	5.04 4.85 0.00	5.21 5.04 0.00	5.38 5.22 0.00	5.55 5.40 0.00	5.72 5.58 0.00	5.89 5.76 0.00	
	1:2 .4 1:1 1/2:3 1:1 1/2	1.46 1.07 0.37	1.63 1.26 0.39	1.80 1.43 0.36	1.97 1.60 0.33	2.14 1.77 0.30	2.31 1.95 0.27	2.48 2.12 0.24	2.65 2.30 0.21	2.82 2.47 0.18	2.99 2.65 0.15	3.16 2.83 0.12	3.33 3.02 0.09	3.50 3.20 0.06	3.67 3.40 0.03	3.84 3.58 0.00	4.01 3.77 0.00	4.18 3.95 0.00	4.35 4.13 0.00	4.52 4.31 0.00	4.69 4.49 0.00	4.86 4.67 0.00	5.03 4.85 0.00	5.20 5.04 0.00	5.37 5.22 0.00	5.54 5.40 0.00	5.71 5.58 0.00	5.88 5.76 0.00
	1:2 .4 1:1 1/2:3 1:1 1/2	1.28 0.90 0.30	1.45 1.08 0.32	1.62 1.25 0.29	1.79 1.43 0.26	1.96 1.60 0.23	2.13 1.77 0.20	2.30 1.95 0.17	2.47 2.12 0.14	2.64 2.30 0.11	2.81 2.47 0.08	2.98 2.65 0.05	3.15 2.83 0.02	3.32 3.02 0.00	3.49 3.20 0.00	3.66 3.40 0.00	3.83 3.58 0.00	4.00 3.77 0.00	4.17 3.95 0.00	4.34 4.13 0.00	4.51 4.31 0.00	4.68 4.49 0.00	4.85 4.67 0.00	5.02 4.85 0.00	5.19 5.04 0.00	5.36 5.22 0.00	5.53 5.40 0.00	5.70 5.58 0.00	5.87 5.76 0.00
1.2%	1:2 .4 1:1 1/2:3 1:1 1/2	1.10 0.73 0.27	1.27 0.86 0.29	1.44 1.07 0.26	1.61 1.25 0.23	1.78 1.43 0.20	1.95 1.60 0.17	2.12 1.77 0.14	2.29 1.95 0.11	2.46 2.12 0.08	2.63 2.29 0.05	2.80 2.47 0.02	2.97 2.65 0.00	3.14 2.83 0.00	3.31 3.02 0.00	3.48 3.20 0.00	3.65 3.40 0.00	3.82 3.58 0.00	3.99 3.77 0.00	4.16 3.95 0.00	4.33 4.13 0.00	4.50 4.31 0.00	4.67 4.49 0.00	4.84 4.67 0.00	5.01 4.85 0			

Properties of Reinforced Concrete Column Sections.

Table 3.

Round Hooped Columns							Square Tied Columns							
%	Mix	I	S ₂	r	C	$k = \frac{700}{400} = 1.75$	% V. Steel	Mix	Axis	I = ad ⁴ Val. of a n	S ₂ = nd ³ Val. of n	r = md Val. of m	Ad C = $\frac{700}{s}$	$K = \frac{700}{1.75} = 400$ C/k
% of V. Steel	Concrete	I = ad ⁴	S ₂ = nd ³	r = md	C = $\frac{Ad}{s}$	C/k	Plain	Plain						
Plain	1:2 :4	0.0491	0.0982	0.250	8.00	4.571-		1:2 :4	□	0.0833	0.1667	0.289	6.000	3.43
	1:1½:3	0.0491	0.0982	0.250	8.00	4.571		All	dia.	0.0833	0.1179	0.289	8.482	4.85
	1:1 :2	0.0491	0.0982	0.250	8.00	4.571-		All	□	0.0833	0.1179	0.289	8.482	4.85
0.5	1:2 :4	0.0553	0.1106	0.248	7.10	4.06		1:2 :4	□	0.0938	0.1876	0.286	5.330	3.05
	1:1½:3	0.0539	0.1079	0.248	7.27	4.15		1:1½:3	□	0.0915	0.1831	0.286	5.461	3.12
	1:1 :2	0.0530	0.1061	0.248	7.40	4.23		1:1 :2	□	0.0915	0.1295	0.286	7.722	4.41
1.0	1:2 :4	0.0615	0.1231	0.246	6.38	3.65		1:1 :2	□	0.0900	0.1801	0.287	5.552	3.17
	1:1½:3	0.0588	0.1176	0.248	6.68	3.82		1:1 :2	dia.	0.0900	0.1274	0.287	7.849	4.48
	1:1 :2	0.0570	0.1141	0.247	6.88	3.93-		1:2 :4	□	0.1042	0.2085	0.283	4.796	2.74
1.5	1:2 :4	0.0676	0.1353	0.242	5.81	3.32		1:2 :4	dia.	0.1042	0.1475	0.283	6.780	3.87
	1:1½:3	0.0636	0.1272	0.244	6.31	3.60		1:1½:3	□	0.0997	0.1995	0.286	5.013	2.86
	1:1 :2	0.0610	0.1221	0.245	6.43	3.67		1:1½:3	dia.	0.0997	0.1412	0.286	7.082	4.05
2.0	1:2 :4	0.0740	0.1480	0.240	5.30	3.06		1:1 :2	□	0.0968	0.1936	0.286	5.165	2.95-
	1:1½:3	0.0686	0.1373	0.242	5.72	3.26		1:1 :2	dia.	0.0968	0.1369	0.286	7.305	4.17
	1:1 :2	0.0651	0.1302	0.244	6.03	3.44		1:2 :4	□	0.1148	0.2296	0.280	4.355	2.49
2.5	1:2 :4	0.0796	0.1593	0.236	4.93	2.81		1:2 :4	dia.	0.1148	0.1622	0.280	6.165	3.52
	1:1½:3	0.0731	0.1462	0.239	5.37	3.07		1:1½:3	□	0.1080	0.2161	0.287	4.627	2.64
	1:1 :2	0.0687	0.1375	0.241	5.71	3.26		1:1½:3	dia.	0.1080	0.1528	0.287	6.544	3.74
3.0	1:2 :4	0.0857	0.1715	0.233	4.58	2.62		1:1 :2	□	0.1035	0.2071	0.283	4.829	2.76
	1:1½:3	0.0779	0.1558	0.237	5.04	2.88		1:1 :2	dia.	0.1035	0.1464	0.283	6.831	3.90
	1:1 :2	0.0726	0.1453	0.239	5.41	3.09		1:2 :4	□	0.1256	0.2512	0.277	3.981	2.28
4.0	1:2 :4	0.0980	0.1960	0.226	4.01	2.29		1:2 :4	dia.	0.1256	0.1775	0.277	5.634	3.22
	1:1½:3	0.0875	0.1750	0.232	4.49	2.57		1:1½:3	□	0.1165	0.2331	0.280	4.290	2.45
	1:1 :2	0.0805	0.1611	0.235	4.87	2.78-		1:1½:3	dia.	0.1165	0.1648	0.280	6.068	3.47
5.0	1:2 :4	0.1101	0.2202	0.220	3.57	2.04		1:1 :2	□	0.1105	0.2210	0.282	4.525	2.59
	1:1½:3	0.0970	0.1941	0.227	4.05	2.31		1:1 :2	dia.	0.1105	0.1563	0.282	6.398	3.66
	1:1 :2	0.0883	0.1766	0.231	4.45	2.54		1:2 :4	□	0.1352	0.2704	0.272	3.698	2.21
6.0	1:2 :4	0.1222	0.2445	0.215	3.21	1.83		1:2 :4	dia.	0.1352	0.1911	0.272	5.233	2.99
	1:1½:3	0.1065	0.2130	0.222	3.69	2.11		1:1½:3	□	0.1240	0.2481	0.276	4.031	2.30
	1:1 :2	0.0960	0.1921	0.227	4.08	2.33		1:1½:3	dia.	0.1240	0.1752	0.276	5.708	3.26
7.0	1:2 :4	0.1336	0.2673	0.208	2.94	1.68		1:1 :2	□	0.1166	0.2333	0.279	4.286	2.45
	1:1½:3	0.1155	0.2311	0.217	3.40	1.94		1:1 :2	dia.	0.1166	0.1650	0.279	6.061	3.46
	1:1 :2	0.1034	0.2069	0.223	3.80	2.17		1:2 :4	□	0.1455	0.2910	0.269	3.436	1.97
8.0	1:2 :4	0.1457	0.2914	0.206	2.70	1.54		1:2 :4	dia.	0.1455	0.2056	0.269	4.846	2.78
	1:1½:3	0.1250	0.2500	0.212	3.14	1.795		1:1½:3	□	0.1322	0.2644	0.273	3.782	2.16
	1:1 :2	0.1112	0.2224	0.219	3.53	2.018-		1:1½:3	dia.	0.1322	0.1870	0.273	5.348	3.05
								1:1 :2	□	0.1233	0.2466	0.276	4.055	2.32
								1:1 :2	dia.	0.1233	0.1742	0.276	5.741	3.28-

meeting at the joint in proportion to their relative rigidities. When the length of the members are the same, the moment of inertia of the cross section will be a direct measure for the rigidity of the member.

Table (3) gives the moment of inertia of column sections. Whenever the mo-

ment of inertia of the floor girders are known, the question of how much of the moment each column and each girder will take care of can be determined.

In monolithic reinforced concrete construction the moment at any joint may be caused by any one or all of the following causes:

Strength of Eccentrically Loaded Reinforced Concrete Columns in Percentages of the Strength of Concentrically Loaded Columns. Round Hooped Columns of 1:1:2 Mix.
For All Percentages of Hooping Reinforcing. **Table 4.**

Core Diam.	Ecc.	Offset	Plain	1%	4%	8%	Core Diam.	Ecc.	Offset	Plain	1%	4%	8%
8"	$\frac{1}{4}$ "	1"	87.5	89.0	92.0	94.1	18"	$\frac{1}{2}$ "	2"	88.7	90.2	92.9	94.1
	$\frac{1}{2}$ "	2"	77.8	80.3	85.2	88.8		1"	4"	79.7	82.1	86.7	89.9
	1"	4"	63.6	67.1	74.2	79.9		2"	.....	66.3	69.6	76.4	81.7
	2"	.....	.....	50.5	59.0	66.5		3"	.....	56.8	60.5	68.3	74.9
	3"	.....	.....	.....	.....	56.9		4"	.....	53.4	61.8	69.0	.....
9"	$\frac{1}{4}$ "	1"	88.7	90.2	92.9	94.7	20"	$\frac{1}{2}$ "	2"	89.8	91.1	93.5	95.2
	$\frac{1}{2}$ "	2"	79.7	82.1	86.7	89.9		1"	4"	81.4	83.6	87.8	90.8
	1"	4"	66.3	69.6	76.4	81.7		2"	.....	68.6	71.8	78.2	83.2
	2"	.....	.....	53.4	61.8	69.0		3"	.....	59.3	62.9	70.6	76.7
	3"	.....	.....	.....	51.9	59.8		4"	.....	52.2	56.0	64.3	71.2
10"	$\frac{1}{4}$ "	1"	89.8	91.1	93.5	95.2	22"	$\frac{1}{2}$ "	2"	90.6	91.8	94.1	95.6
	$\frac{1}{2}$ "	2"	81.4	83.6	87.8	90.8		1"	4"	82.8	84.9	88.8	91.6
	1"	4"	68.6	71.8	78.2	83.2		2"	.....	70.6	73.7	79.8	84.5
	2"	.....	52.2	56.0	64.3	71.2		3"	.....	61.6	65.1	72.6	78.4
	3"	.....	.....	.....	54.5	62.3		4"	.....	54.6	58.3	66.4	73.2
11"	$\frac{1}{4}$ "	1"	90.6	91.8	94.1	95.6	24"	$\frac{1}{2}$ "	2"	91.2	92.4	94.5	96.0
	$\frac{1}{2}$ "	2"	82.8	84.9	88.8	91.6		1"	4"	83.8	86.0	89.6	92.3
	1"	4"	70.6	73.7	79.8	84.5		2"	.....	72.4	75.4	81.2	85.6
	2"	.....	54.6	58.3	66.4	73.2		3"	.....	63.6	67.1	74.2	79.9
	3"	.....	.....	.....	56.9	64.5		4"	.....	56.8	60.5	68.3	74.9
12"	$\frac{1}{2}$ "	2"	84.0	86.0	89.6	92.3	28"	$\frac{1}{2}$ "	2"	92.4	93.5	95.2	96.5
	1"	4"	72.4	75.4	81.2	85.6		1"	4"	86.0	87.7	91.0	93.3
	2"	.....	56.8	60.5	68.3	74.9		2"	.....	75.4	78.1	83.4	87.4
	3"	.....	.....	50.5	59.0	66.5		3"	.....	62.9	70.4	77.0	82.2
	4"	.....	.....	.....	51.9	59.8		4"	.....	60.5	64.0	71.6	77.6
14"	$\frac{1}{2}$ "	2"	86.0	87.7	91.0	93.3	32"	$\frac{1}{2}$ "	2"	93.4	94.3	95.9	97.0
	1"	4"	75.4	78.1	83.4	87.4		1"	4"	87.5	89.0	92.0	94.1
	2"	.....	60.5	64.0	71.6	77.6		2"	.....	77.8	80.3	85.2	88.8
	3"	.....	50.5	54.3	62.7	69.8		3"	.....	70.0	73.0	79.3	84.1
	4"	.....	.....	.....	55.7	63.5		4"	.....	63.6	67.1	74.2	79.9
16"	$\frac{1}{2}$ "	2"	87.5	89.0	92.0	94.1	36"	$\frac{1}{2}$ "	2"	94.0	94.8	96.2	97.3
	1"	4"	77.8	80.3	85.2	88.8		1"	4"	88.7	90.2	92.9	94.7
	2"	.....	63.6	67.1	74.2	79.9		2"	.....	79.7	82.1	86.7	89.9
	3"	.....	53.8	57.5	65.7	72.6		3"	.....	72.4	75.4	81.2	85.6
	4"	.....	.....	50.5	59.0	66.5		4"	.....	66.3	69.6	76.4	81.7

(1) By the column above being eccentric with respect to the column below.

(2) By the unbalanced moments at the face of the column in beams or girders framing into the columns from opposite sides.

(3) By the beam or girder being placed eccentric with respect to the column axis.

The moments caused by the second and third of these items may or may not be of the same sign as that of the eccentric load from the column above.

Roughly speaking, we would err on the safe side by assuming that the total moment

will be divided equally between the column above and the column below.

When the columns in two consecutive stories are flush on one side and are offset on the other side, as is often the case with wall columns the eccentricity of the axis of the two columns will be $\frac{1}{2}$ of the offset. If then each column takes half the moment, the eccentricity for each column will be $\frac{1}{4}$ of the offset. This assumption although a rough one, has been made in tables (4) and (5) in order to assist in getting a line on the real eccentricity for the case in hand. Of course on this basis the maximum eccen-

Strength of Eccentrically Loaded Reinforced Concrete Columns in Percentages of the Strength of Concentrically Loaded Columns.

Table 5.

Axis Parallel with Side of Column						Axis Taken Diagonally with Column							
			Square Tied Columns, 1:1:2 Mix						Square Tied Columns, 1:1:2 Mix				
Core Diam.	Ecc.	Offset One Side	Plain	1% e	2% e	3% e	Core Diam.	Ecc.	Offset 2 Con. Sides	Plain	1% e	2% e	3% e
8"	$\frac{1}{4}$ "	1"	90.3	91.6	92.5	92.3	8"	$\frac{1}{4}$ "	1"	86.9	88.5	89.8	90.7
	$\frac{1}{2}$ "	2"	82.4	84.5	86.1	87.3		$\frac{1}{2}$ "	2"	76.8	79.4	81.4	83.0
	1"	4"	70.0	73.0	75.6	77.5		1"	4"	62.3	65.7	68.6	70.9
	2"	.....	53.8	57.5	60.8	63.3		2"	.....	.....	.....	52.2	54.9
	3"	.....	.....	.....	50.8	53.5		3"	.....	.....	.....	.....	.....
9"	$\frac{1}{4}$ "	1"	91.3	92.4	93.3	94.0	9"	$\frac{1}{4}$ "	1"	88.1	89.6	90.7	91.7
	$\frac{1}{2}$ "	2"	84.0	85.9	87.4	88.6		$\frac{1}{2}$ "	2"	78.8	81.2	83.1	84.6
	1"	4"	72.4	75.3	77.7	79.5		1"	4"	65.0	68.3	71.1	73.3
	2"	.....	56.8	60.4	63.5	66.0		2"	.....	.....	51.9	55.1	57.8
	3"	.....	.....	50.4	53.7	56.4		3"	.....	.....	.....	.....	.....
10"	$\frac{1}{4}$ "	1"	92.1	93.1	93.9	94.5	10"	$\frac{1}{4}$ "	1"	89.2	90.6	91.6	92.4
	$\frac{1}{2}$ "	2"	85.4	87.1	88.6	89.6		$\frac{1}{2}$ "	2"	80.5	82.8	84.5	85.9
	1"	4"	74.5	77.2	79.4	81.2		1"	4"	67.3	70.6	73.2	75.3
	2"	.....	59.3	62.9	65.9	68.3		2"	.....	50.8	54.5	57.7	60.4
	3"	.....	.....	53.0	56.3	59.0		3"	.....	.....	.....	.....	50.4
11"	$\frac{1}{4}$ "	1"	92.8	93.7	94.4	95.0	11"	$\frac{1}{4}$ "	1"	90.9	91.3	92.3	93.0
	$\frac{1}{2}$ "	2"	86.5	88.2	89.5	90.5		$\frac{1}{2}$ "	2"	82.0	84.0	85.8	87.0
	1"	4"	76.2	78.9	81.0	82.6		1"	4"	69.4	72.5	75.0	77.0
	2"	.....	61.6	65.1	68.0	70.4		2"	.....	53.2	56.9	60.0	62.7
	3"	.....	51.7	55.4	58.7	61.2		3"	.....	.....	.....	50.0	52.8
12"	$\frac{1}{2}$ "	2"	87.5	89.0	90.3	91.2	12"	$\frac{1}{2}$ "	2"	83.2	85.2	86.7	88.0
	1"	4"	77.8	80.3	82.3	83.8		1"	4"	71.2	74.2	76.6	78.6
	2"	.....	63.6	67.0	69.9	72.2		2"	.....	55.3	59.0	62.1	64.6
	3"	.....	53.8	57.5	60.8	63.3		3"	.....	.....	.....	52.2	54.9
	4"	.....	.....	50.4	53.7	56.4		4"	.....	.....	.....	.....	.....
14"	$\frac{1}{2}$ "	2"	89.1	90.5	91.6	92.3	14"	$\frac{1}{2}$ "	2"	85.3	87.0	88.4	89.5
	1"	4"	80.3	82.6	84.4	85.8		1"	4"	74.3	77.0	79.2	81.0
	2"	.....	67.1	70.3	73.0	75.1		2"	.....	59.1	62.7	65.6	68.1
	3"	.....	57.6	61.2	64.4	66.8		3"	.....	.....	52.8	56.0	58.7
	4"	.....	50.5	54.2	57.5	60.2		4"	.....	.....	.....	.....	51.6
16"	$\frac{1}{2}$ "	2"	90.3	91.6	92.5	92.3	16"	$\frac{1}{2}$ "	2"	86.8	88.5	89.8	90.7
	1"	4"	82.4	84.5	86.1	87.3		1"	4"	76.7	79.4	81.4	83.0
	2"	.....	70.0	73.0	75.6	77.5		2"	.....	62.3	65.7	68.6	70.9
	3"	.....	60.9	64.4	67.3	69.7		3"	.....	52.4	56.1	59.3	61.9
	4"	.....	53.8	57.5	60.7	63.3		4"	.....	.....	.....	52.2	54.9

tricity exists at one or both ends of the column and the eccentricity at any point along the length of the column can easily be determined.

Reviewing the results in table (2), which represents the safe allowable unit compressive stresses allowed by the Chicago Building Ordinance, it will be observed that for the highest percentages of steel practically the same strength is obtained for the different

mixtures of concrete. When the ordinance was drawn up the author pointed out that the empirical rule of the Chicago Ordinance allowed a lean mixture to obtain a greater strength than a rich mixture of concrete. The committee then made the rule that no leaner mixture than 1:2:4 was to be allowed in reinforced concrete columns. Table (2) shows that this rule did not take care of the matter completely. The committee should

**Strength of Eccentrically Loaded Reinforced Concrete Columns in Percentages of the
Strength of Concentrically Loaded Columns.** Table 5.

Axis Parallel with Side of Column							Axis Taken Diagonally with Column						
			Square Tied Columns, 1:1:2 Mix							Square Tied Columns, 1:1:2 Mix			
Core Diam.	Ecc.	Offset One Side	Plain	1%	2%	3%	Core Diam.	Ecc.	Offset 2 Con. Sides	Plain	1%	2%	3%
18"	$\frac{1}{2}$ "	2"	91.3	92.4	93.3	94.0	18"	$\frac{1}{2}$ "	2"	88.1	89.6	90.7	91.7
	1"	4"	84.0	85.9	87.4	88.6		1"	4"	78.8	81.2	83.1	84.6
	2"	.....	72.4	75.3	77.7	79.5		2"	.....	65.0	68.3	71.1	73.3
	3"	.....	63.6	67.0	69.9	72.2		3"	.....	55.3	59.0	62.1	64.6
	4"	.....	56.8	60.4	63.5	66.0		4"	.....	.....	51.9	55.1	57.8
20"	$\frac{1}{2}$ "	2"	92.1	93.1	93.9	94.5	20"	$\frac{1}{2}$ "	2"	89.2	90.6	91.6	92.4
	1"	4"	85.4	87.1	88.6	89.6		1"	4"	80.5	82.8	84.5	85.9
	2"	.....	74.5	77.2	79.4	81.2		2"	.....	67.3	70.6	73.2	75.3
	3"	.....	66.1	69.3	71.5	74.2		3"	.....	57.9	61.5	64.5	67.0
	4"	.....	59.3	62.9	65.9	68.3		4"	.....	50.8	54.5	57.7	60.4
22"	$\frac{1}{2}$ "	2"	92.8	93.7	94.4	95.0	22"	$\frac{1}{2}$ "	2"	90.1	91.3	92.3	93.0
	1"	4"	86.5	88.2	89.4	90.5		1"	4"	82.0	84.0	85.8	87.0
	2"	.....	76.2	78.9	81.0	82.6		2"	.....	69.4	72.5	75.0	77.0
	3"	.....	68.1	71.3	73.9	76.0		3"	.....	60.2	63.7	66.7	69.1
	4"	.....	61.6	65.1	68.0	70.3		4"	.....	53.2	56.9	60.0	62.7
24"	$\frac{1}{2}$ "	2"	93.3	94.2	94.9	95.4	24"	$\frac{1}{2}$ "	2"	90.8	92.0	92.9	93.0
	1"	4"	87.5	89.0	90.3	91.2		1"	4"	83.2	85.2	86.7	88.5
	2"	.....	77.8	80.3	82.3	83.8		2"	.....	71.2	74.2	76.6	85.3
	3"	.....	70.0	73.0	75.6	77.5		3"	.....	62.3	65.7	68.6	70.9
	4"	.....	63.6	67.0	69.9	72.2		4"	.....	55.3	59.0	62.1	64.6
28"	$\frac{1}{2}$ "	2"	94.3	95.0	95.6	96.1	28"	$\frac{1}{2}$ "	2"	92.0	93.0	93.9	94.4
	1"	4"	89.1	90.5	91.5	92.3		1"	4"	85.3	87.0	88.4	89.5
	2"	.....	80.3	82.6	84.4	85.8		2"	.....	74.3	77.0	79.2	81.0
	3"	.....	73.2	76.0	78.3	80.1		3"	.....	65.8	69.1	71.8	74.0
	4"	.....	67.1	70.3	73.0	75.1		4"	.....	59.1	62.7	65.6	68.1
32"	$\frac{1}{2}$ "	2"	95.0	95.6	96.2	96.5	32"	$\frac{1}{2}$ "	2"	92.9	93.9	94.6	95.1
	1"	4"	90.3	91.6	92.5	93.3		1"	4"	86.8	88.5	89.8	90.7
	2"	.....	82.4	84.5	86.1	87.3		2"	.....	76.7	79.4	81.4	83.0
	3"	.....	75.7	78.4	80.5	82.2		3"	.....	68.7	71.9	74.5	76.5
	4"	.....	70.0	73.0	75.6	77.5		4"	.....	62.2	65.7	68.6	70.9
36"	$\frac{1}{2}$ "	2"	95.4	96.1	96.5	96.9	36"	$\frac{1}{2}$ "	2"	93.7	94.5	95.1	95.6
	1"	4"	91.3	92.4	93.3	94.0		1"	4"	88.1	89.6	90.7	91.3
	2"	.....	84.0	85.9	87.4	88.6		2"	.....	78.8	81.2	82.9	84.6
	3"	.....	77.8	80.3	82.2	83.8		3"	.....	71.2	74.2	76.6	78.6
	4"	.....	72.4	75.3	77.7	79.5		4"	.....	65.0	68.3	71.1	73.3

also have established a maximum limit of stress for each mixture of concrete, as for example:

1100 lbs. for 1 : 2 : 4 concrete
1300 lbs. for 1 : $1\frac{1}{2}$: 3 concrete and
1630 lbs. for 1 : 1 : 2 concrete.

Unfortunately the ordinance allows this highest stress for the 1:2:4 concrete. However, any competent engineer, who is alive to the fitness of things will not use such

high stresses in his own work. This shows that even the rules given in the ordinance may lead to unscientific design when used without judgment. Even when these recommendations are lived up to the Chicago Ordinance requirements for reinforced concrete columns are not too conservative, as many would lead us to believe, as there are still too many uncertainties both in the design, material and workmanship for such columns.

ULTIMATE AND SAFE STRENGTH OF CONCRETE IN POUNDS PER SQUARE INCH

Modulus of Elasticity of P. C. Stone Concrete 1:2-4-60 Days Old for Various Stresses	Modulus of Elasticity	Strength of 1:2:4 P. C. Stone Concrete for Various Ages	Compression on Top Fibers of Beams			Modulus of Elasticity	
			Ultimate		Safe	Ultimate	
			From	To		From	To
Initial Mod. of Elasticity....	2,000,000	1 Day Old	200	300	0		
E. for Stress of 400 lbs pr. □	1,700,000	2 " "	400	700	100		
" " 600 " "	1,600,000	4 " "	600	1000	200	800,000	1,300,000
" " 800 " "	1,500,000	7 " "	900	1500	375	1,200,000	2,000,000
" " 1000 " "	1,400,000	1 Month Old.....	1200	2000	500	1,600,000	2,600,000
" " 1200 " "	1,300,000	2 " "	1400	2300	575	1,800,000	3,000,000
" " 1400 " "	1,100,000	3 " "	1500	2500	625	2,000,000	3,300,000
" " 1600 " "	900,000	6 " "	1600	2700	675	2,200,000	3,600,000
" " 1800 " "	600,000	1 Year Old.....	1700	2900	725	2,300,000	3,800,000
E. for Ultimate Strength....	0	2 " "	1800	3000	750	2,400,000	4,000,000

These tables will cover variations of the material and give the range of strength that could be expected of good ordinary materials and workmanship. Inferior materials will come below the lowest limits given in these tables, and superior materials will come above the highest limits. The safe compressive unit stress to be used for long columns should be obtained from the use of some approved column formulae, which also should take care of possible eccentric applications of the load.

The safe extreme fiber stress for long, narrow beams and girders, including plate girders, not braced sideways, should also be obtained from some approved column formulae. In this manner the lateral strength of beams is

provided for.

The following method is believed to conform with good practice for computing loads in buildings:

Figure all parts of the building for the full dead load. Figure joists and beams for the full live load.

Figure girders for 85 to 90 per cent of the live load.

Figure the columns supporting the roof and top story of a building for the full live load. For each succeeding story below, make a reduction of 6 per cent in the full live load coming on the columns. This reduction must however, not exceed 50 per cent of the full live load for a many stored building.

Figure the foundations for one-third of the full live load.

ULTIMATE AND SAFE STRENGTH OF MASONRY IN POUNDS PER SQUARE INCH.

MATERIAL	Compression			Safe Bearing	Modulus of Elasticity			Shear			Tension			Weight per Cubic Foot	
	Ultimate		Safe		Ultimate		Safe	Ultimate		Safe	Ultimate		Safe		
	From	To			From	To		From	To		From	To			
	Av.				From	To	Av.			From	To	Av.			From	To
Hard Brick Work in P. C.	2000	3000	200	275	1,500,000	2,500,000	.....	.....	.....	.....	100	200	20	130	150
Common " " P. C.	1500	2500	175	250	1,500,000	2,500,000	.....	.....	.....	.....	100	200	20	110	130
" " " N. C.	1000	2000	150	200	1,000,000	1,500,000	.....	.....	.....	.....	50	100	10	110	130
" " " L. M.	800	1600	100	150	500,000	1,000,000	.....	.....	.....	.....	20	40	5	110	130
" " " P. C. & L. M.	1000	2000	150	200	1,000,000	1,500,000	.....	.....	.....	.....	50	100	10	110	130
Old Brick Work in P. C.	2000	3000	200	275	2,000,000	3,000,000	.....	.....	.....	.....	120	250	25	110	130
" " " N. C.	1500	2500	175	250	1,500,000	2,000,000	.....	.....	.....	.....	70	120	15	110	130
" " " L. M.	1000	2000	150	200	1,000,000	1,500,000	.....	.....	.....	.....	25	50	7	110	130
Brick Piers in P. C.	1500	2500	175	250	1,500,000	2,500,000	.....	.....	.....	.....	100	200	20	110	130
" " " L. M.	800	1600	100	150	500,000	1,000,000	.....	.....	.....	.....	20	40	5	110	130
Rubble Work in P. C.	1000	2000	150	200	1,500,000	2,500,000	.....	.....	.....	.....	70	150	20	130	150
Coursed Rubble in P. C.	1500	2500	175	250	2,000,000	3,000,000	.....	.....	.....	.....	100	200	20	140	160
Neat P. C.	2000	4000	200	300	1,500,000	3,000,000	.....	.....	.....	.....	1200	2400	300	80	90
Neat N. C.	1000	3000	175	250	1,000,000	2,000,000	.....	.....	.....	.....	700	1500	125	60	70
P. C. Mortar 1:3	1500	2500	175	250	1,000,000	2,000,000	.....	.....	.....	.....	200	400	30	120	130
N. C. Mortar 1:2	800	1500	150	200	800,000	1,500,000	.....	.....	.....	.....	150	300	25	100	120
Lime Mortar	200	400	100	150	500,000	800,000	.....	.....	.....	.....	50	100	10	90	110
P. C. Stone Concrete 1:2:4	1500	3500	400	500	1,500,000	3,500,000	.....	.....	.....	.....	800	1200	125	140	150
" " " 1:2:5	1000	2000	300	300	1,000,000	2,000,000	.....	.....	.....	.....	500	1000	80	150	150
P. C. Cinder	800	1600	150	200	500,000	1,000,000	.....	.....	.....	.....	70	120	10	100	110
Granite	12000	20000	400	600	3,000,000	6,000,000	.....	.....	.....	.....	1200	2400	300	160	180
Limestone	6000	12000	350	500	2,000,000	5,000,000	.....	.....	.....	.....	1000	2000	175	150	170
Sandstone	5000	10000	300	400	1,000,000	3,000,000	.....	.....	.....	.....	800	1600	125	140	160
Brick and Tile	2000	5000	200	300	1,000,000	3,000,000	.....	.....	.....	.....	500	1000	80	120	140

PERCENTAGE OF HOOPING FOR VARIOUS CORE DIAMETERS AND HOOPING FOR HOOPED REINFORCED CONCRETE COLUMNS.

BY BENJ. E. WINSLOW, Mem. A. I. A. and Mem. Am. Soc. C. E.

MAXIMUM PITCH OF SPIRALS TO BE NOT GREATER THAN 1/10 THE DIAM. OF COL. NOR GREATER THAN 3"		Minimum No. of Rods											
		3/16" Hooping				1/4" Hooping				5/16" Hooping			
Pitch	1 5/8"	1 1/2"	1 1/4"	1 3/8"	1 1/2"	1 1/4"	1 3/8"	1 1/2"	1 3/8"	1 1/4"	1 3/8"	1 1/2"	1 3/8"
9	0.89	0.82	1.46										
10	0.80	0.74	1.31										
11	0.73	0.67	1.18										
12	0.67	0.61	1.09	1.01	0.94	0.87	0.82	1.27	1.14	1.03			
13	0.62	0.57	1.01	0.93	0.87	0.81	0.75	1.17	1.06	0.95			
14	0.57	0.53	0.94	0.87	0.81	0.75	0.70	1.09	0.98	0.88			
15	0.54	0.49	0.87	0.81	0.75	0.70	0.65	1.02	0.91	0.82			
16	0.50		0.82	0.76	0.70	0.66	0.61	0.96	0.85	0.77			
17	0.47		0.77	0.71	0.65	0.62	0.58	0.90	0.81	0.72			
18			0.73	0.67	0.63	0.58	0.54	0.85	0.76	0.68			
19			0.69	0.64	0.59	0.55	0.52	0.81	0.72	0.65			
20			0.66	0.61	0.56	0.52	0.49	0.78	0.68	0.61			
21			0.62	0.58	0.54	0.50		0.73	0.65	0.58			
22			0.60	0.55	0.51	0.48		0.70	0.62	0.56			
23			0.57	0.53	0.49			0.67	0.59	0.53			
24			0.55	0.50				0.64	0.57	0.51			
25			0.52	0.49				0.61	0.55	0.49			
26			0.50					0.59	0.53				
27			0.49					0.57	0.51				
28								0.55					
29								0.53					
30								0.51					
32								0.48					
34								0.48					
36								0.48					
38								0.48					
40								0.47					
42								0.47					
44								0.47					
46								0.47					
48								0.47					
50								0.47					
52								0.47					
54								0.47					

NOTE: Values inside of heavy lines are within the limits set by the Chicago Building Ordinance. See Sec. 546-567.

Pitch	7/16" Hooping				1/2" Hooping				3/16" Hooping			
	1 3/8"	1 1/2"	2"	2 1/2"	1 3/8"	1 1/2"	2"	2 1/2"	1 3/8"	1 1/2"	2"	2 1/2"
16	1.50	1.37	1.25		1.50	1.37	1.25		1.53			
17	1.41	1.29	1.18		1.41	1.29	1.18		1.45			
18	1.33	1.22	1.11		1.33	1.22	1.11		1.37			
19	1.26	1.16	1.05		1.26	1.16	1.05		1.30			
20	1.41	1.33	1.29	1.10	1.41	1.33	1.29	1.10	1.43	1.30		
21	1.53	1.43	1.35	1.27	1.53	1.43	1.35	1.27	1.50	1.36	1.24	
22	1.46	1.37	1.29	1.22	1.46	1.37	1.29	1.22	1.43	1.30	1.18	1.58
23	1.49	1.39	1.31	1.23	1.49	1.39	1.31	1.23	1.52	1.37	1.24	1.51
24	1.34	1.25	1.18	1.11	1.34	1.25	1.18	1.11	1.31	1.19	1.09	1.44
25	1.37	1.28	1.20	1.13	1.37	1.28	1.20	1.13	1.45	1.31	1.19	1.51
26	1.32	1.23	1.16	1.09	1.32	1.23	1.16	1.09	1.48	1.34	1.21	1.45
27	1.27	1.19	1.11	1.05	1.27	1.19	1.11	1.05	1.41	1.26	1.10	1.33
28	1.23	1.15	1.07	1.01	1.23	1.15	1.07	1.01	1.37	1.29	1.16	1.34
29	1.18	1.10	1.04	0.98	1.18	1.10	1.04	0.98	1.32	1.25	1.12	1.42
30	1.14	1.07	1.00	0.94	1.14	1.07	1.00	0.94	1.27	1.20	1.08	1.52
32	1.07	1.00	0.95	0.88	1.07	1.00	0.95	0.88	1.23	1.16	1.05	1.32
34	1.01	0.94	0.88	0.83	1.01	0.94	0.88	0.83	1.15	1.09	0.98	1.24
36	0.95	0.89	0.83	0.79	0.95	0.89	0.83	0.79	1.09	1.02	0.97	1.16
38	0.90	0.84	0.79	0.75	0.90	0.84	0.79	0.75	1.03	0.97	0.92	1.10
40	0.86	0.80	0.75	0.71	0.86	0.80	0.75	0.71	0.98	0.92	0.87	1.06
42	0.82	0.76	0.72	0.67	0.82	0.76	0.72	0.67	0.94	0.88	0.83	1.00
44	0.78	0.73	0.68	0.64	0.78	0.73	0.68	0.64	0.91	0.85	0.80	0.95
46	0.75	0.70	0.65	0.62	0.75	0.70	0.65	0.62	0.88	0.83	0.79	0.90
48	0.72	0.67	0.63	0.59	0.72	0.67	0.63	0.59	0.87	0.82	0.77	0.86
50	0.69	0.64	0.60	0.57	0.69	0.64	0.60	0.57	0.84	0.79	0.74	0.82
52	0.66	0.62	0.58	0.54	0.66	0.62	0.58	0.54	0.80	0.76	0.71	0.80
54	0.64	0.59	0.56	0.52	0.64	0.59	0.56	0.52	0.77	0.73	0.68	0.76
56	0.61	0.57	0.54	0.50	0.61	0.57	0.54	0.50	0.75	0.71	0.67	0.74
60	0.57	0.53	0.50	0.47	0.57	0.53	0.50	0.47	0.70	0.66	0.62	0.69

FORMULAS FOR CONCRETE COLUMNS ACCORDING TO THE CHICAGO BUILDING ORDINANCES.

- I. For All Concrete Columns:
 $W = Af$ W = Total safe load in lbs.
 A = Total cross section area of columns in sq. ins. for II.
 f = Average allowable unit stress in lbs. per sq. in. (in II and III).
 p = Percentage of vertical steel (expressed in whole numbers).
 p' = Percentage of hooping steel (expressed in whole numbers).
Maximum height of columns must not exceed 12 x diameter, and no column shall have a cross section area of less than 64 sq. in.
- II. Reinforced Concrete Columns III. Hooped Reinforced Concrete Columns:
1:1.2 Concrete $f = 580$ (1+0.09p) 1:1.2 Concrete $f = 725$ (1+0.25p') (1+0.09p)
1:1 1/2:3 Concrete $f = 480$ (1+0.11p) 1:1 1/2:3 Concrete $f = 600$ (1+0.25p') (1+0.11p)
1:2:4 Concrete $f = 400$ (1+0.14p) 1:2:4 Concrete $f = 500$ (1+0.375p') (1+0.14p)
= 580 + 52.2p = 600 + 66p
= 480 + 52.8p = 500 + 66p
= 400 + 56p = 500 + 70p

(See Sec. 552 Building Ordinances of Chicago, Ill.)

TABLE I.

Copyrighted 1916, by Benj. E. Winslow.

Safe Extreme Fiber Stresses for Reinforced Concrete Beams in Accordance with the Chicago Building Ordinance Requirements for Concrete of Various Mixtures and Various Safe Stresses in the Steel Reinforcement. Straight Line Theory.

BY BENJ. E. WINSLOW, Mem. A. I. A. and Mem. Am. Soc. C. E.

Percentage of tensile reinforcing.	Mixture of concrete. Stone.					Stress in steel.	
	1:1.2.	1:1½:3.	1:2.4.	1:2½:5.	1:3:7.	16000.	18000.
0.00	58	48	40	35	30	0	0
0.01	11	11	11	11	11	9	11
0.02	21	21	21	21	21	19	21
0.03	31	31	31	31	31	28	31
0.04	41	41	41	41	41	37	42
0.05	50	50	50	50	50	45	50
0.06	60	60	60	60	60	55	60
0.07	70	70	70	70	70	65	70
0.08	80	80	80	80	80	70	80
0.09	90	90	90	90	90	80	90
0.10	100	100	100	100	100	90	100
0.11	115	115	115	110	110	100	115
0.12	125	125	125	120	120	110	125
0.13	135	135	135	130	130	120	135
0.14	145	145	145	140	140	125	145
0.15	150	150	150	145	145	135	150
0.16	160	160	160	155	155	145	160
0.17	170	170	170	165	165	150	170
0.18	180	180	180	175	175	160	180
0.19	190	190	190	185	185	170	190
0.20	205	205	205	200	200	180	205
0.22	220	220	220	215	215	195	220
0.24	240	240	240	235	235	210	240
0.26	260	260	260	250	250	230	260
0.28	280	280	275	270	270	245	275
0.30	300	300	295	295	290	265	295
0.32	320	320	315	315	310	280	315
0.34	335	335	330	330	325	295	330
0.36	355	355	350	350	345	310	350
0.38	375	375	370	370	365	330	375
0.40	395	395	390	390	385	345	390
0.42	415	415	410	400	400	365	410
0.44	430	430	425	420	420	380	425
0.46	450	450	445	440	440	395	445
0.48	470	470	465	460	455	410	465
0.50	490	485	480	475	470	430	480
0.52	510	505	500	495	490	445	515
0.54	525	520	515	510	505	460	515
0.56	545	540	535	530	515	480	535
0.58	565	560	555	550	520	495	555
0.60	585	580	575	570	530	510	575
0.62	600	595	590	585	535	525	595
0.64	620	615	610	595	540	540	610
0.66	640	635	630	600	540	560	630
0.68	660	655	650	605	545	575	650
0.70	675	670	665	610	550	590	665
0.72	695	690	680	620	555	605	670
0.74	715	710	685	625	560	620	700
0.76	730	725	690	630	565	635	720
0.78	750	745	695	635	570	655	735
0.80	770	760	700	635	575	670	755
0.82	790	780	710	640	580	685	770
0.84	805	795	715	650	585	700	790
0.86	820	805	720	655	590	715	805
0.88	840	810	725	660	595	730	825
0.90	860	815	730	660	600	750	840
0.92	875	820	735	665	600	765	860

See note on following page.

Percentage of tensile reinforcing.	Mixture of concrete. Stone.					Stress in steel.	
	1:1.2.	1:1½:3.	1:2.4.	1:2½:5.	1:3:7.	16000.	18000.
0.94	895	825	740	670	605	780	875
0.96	920	835	745	675	610	795	895
0.98	930	840	750	680	615	810	910
1.00	950	845	755	685	620	825	930
1.1	980	870	780	700	635	905	1015
1.2	1010	895	800	720	650	980	1105
1.3	1030	920	815	740	660	1055	1190
1.4	1055	940	835	750	680	1135	1275
1.5	1080	960	850	760	690	1205	1360
1.6	1100	980	865	780	695	1285	1445
1.7	1120	995	880	790	710	1355	1530
1.8	1140	1010	895	800	720	1435	1610
1.9	1160	1025	905	810	725	1505	1695
2.0	1175	1040	920	830	740	1580	1780
2.5	1250	1090	965	865	775	1945	2190
3.0	1310	1150	1010	895	800	2305	2590
3.5	1360	1190	1040	925	820	2660	2990
4.0	1405	1220	1070	950	840	3010	3385
4.5	1440	1250	1090	965	860	3355	3770
5.0	1470	1280	1110	980	870	3700	4165

TABLE II.

Ultimate Extreme Fiber Stresses for Concrete Beams Reinforced with High Carbon Steel—Straight Line Theory.

By L. J. MENSCH, Mem. Am. Soc. C. E.

X tensile steel.	Ultimate Compressive Strength Obtained from Cylinder Tests.					
	2900	2400	2000	1750	1500	700
	1:1.2	1:1½:3	1:2.4	1:2½:5	1:3:7	
0.25	1040	1030	1020	1010	1010	960
0.30	1240	1230	1220	1200	1190	1080
0.35	1430	1420	1400	1380	1370	1200
0.40	1630	1610	1580	1560	1550	1330
0.45	1820	1800	1760	1740	1710	1440
0.50	2010	1970	1940	1900	1870	1540
0.55	2190	2150	2110	2060	2030	1620
0.60	2370	2330	2280	2230	2170	1700
0.65	2540	2500	2440	2370	2310	1800
0.70	2720	2650	2600	2520	2450	1800
0.75	2900	2820	2740	2660	2590	1800
0.80	3070	2990	2900	2800	2720	1800
0.85	3240	3150	3040	2930	2830	1800
0.90	3400	3300	3180	3060	2950	1800
0.95	3560	3440	3320	3200	3050	1800
1.00	3700	3570	3450	3310	3160	1800
1.10	4020	3860	3700	3520	3350	1800
1.20	4300	4120	3930	3730	3510	1800
1.30	4600	4380	4140	4000	3600	1800
1.40	4860	4610	4330	4000	3600	1800
1.50	5120	4820	4520	4000	3600	1800
1.60	5370	5050	4600	4000	3600	1800
1.70	5600	5250	4600	4000	3600	1800
1.80	5820	5450	4600	4000	3600	1800
1.90	6040	5600	4600	4000	3600	1800
2.00	6260	5750	4600	4000	3600	1800
2.25	6700	5800	4600	4000	3600	1800

TABLE III.

Copyright 1916 by Benj. E. Winslow.

Safe Extreme Fiber Stresses in Pounds per Square Inch for Double Reinforced Concrete Beams for Various Percentages of Top and Bottom Steel. Straight Line Theory.

BY BENJ. E. WINSLOW, Mem. A. I. A. and Mem. Am. Soc. C. E.

Maximum Compression on Extreme Fiber of Concrete=700 Lbs. per Sq. In. Maximum Tension in Steel Reinforcement=18000 Lbs. per Sq. In. Mixture of Concrete 1:2:4. Ratio of Modulus of Elasticity of Steel to That of Concrete=15. Ratio of Depth of Top Steel to Depth of Bottom Steel Below Top of Beam=0.10. Values for Other Steel and Concrete Stresses Are Directly Proportionate to Those Given in This Table.

		Percentage of Compressive Steel																
		0.00	0.10	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00			
Percentage of Tensile Steel	0.60	575	578	579	580	581	582	583	584	584	585	586	587	588	589	0.60	Percentage of Tensile Steel	
	0.62	595	596	597	599	600	601	602	603	604	605	606	607	608	609	0.62		
	0.64	610	612	613	615	616	618	619	621	622	624	625	627	628	629	0.64		
	0.66	630	632	633	635	636	638	639	641	642	644	645	647	648	649	0.66		
	0.68	650	652	653	655	656	658	659	661	662	663	665	666	667	668	0.68		
	0.70	665	667	668	670	671	673	674	676	677	678	680	682	684	686	0.70		
	0.72	680	688	689	691	693	694	696	697	699	700	702	703	705	706	0.72		
	0.74	685	704	706	707	709	710	712	713	715	716	718	719	721	723	0.74		
	0.76	690	720	726	728	729	731	732	734	735	737	738	740	741	743	0.76		
	0.78	695	726	744	746	747	749	750	752	753	755	757	759	761	763	0.78		
	0.80	700	731	762	764	766	768	770	772	774	776	778	780	781	783	0.80		
	0.82	710	739	779	782	784	786	788	790	792	794	796	798	800	802	0.82		
	0.84	715	743	790	800	802	804	806	808	810	812	814	816	818	821	0.84		
	0.86	720	750	795	820	822	824	826	828	830	832	834	836	838	840	0.86		
	0.88	725	755	800	839	842	844	846	848	850	852	854	856	858	860	0.88		
	0.90	730	760	807	858	861	863	866	868	870	872	874	876	878	880	0.90		
	0.92	735	765	812	873	880	883	885	887	890	892	894	896	898	900	0.92		
	0.94	740	770	818	888	900	902	904	906	908	910	912	914	916	918	0.94		
	0.96	745	775	823	892	920	922	924	926	928	930	932	934	935	937	0.96		
	0.98	750	780	828	900	938	940	942	944	946	948	950	952	954	956	0.98		
1.00	755	786	832	905	956	958	960	962	964	967	969	972	974	976	1.00			
1.10	780	811	853	930	1010	1060	1061	1063	1065	1066	1068	1069	1071	1072	1.10			
1.20	800	828	874	954	1031	1105	1155	1157	1159	1161	1163	1165	1167	1170	1.20			
1.30	815	850	895	978	1058	1130	1210	1252	1254	1256	1258	1260	1262	1265	1.30			
1.40	835	869	916	1006	1076	1156	1232	1310	1345	1348	1351	1354	1358	1362	1.40			
1.50	850	882	935	1020	1100	1178	1255	1331	1410	1450	1452	1455	1457	1460	1.50			
1.60	865	899	950	1034	1115	1196	1276	1352	1435	1511	1547	1550	1553	1555	1.60			
1.70	880	913	967	1054	1130	1215	1296	1374	1455	1538	1630	1650	1652	1655	1.70			
1.80	895	928	983	1064	1149	1232	1316	1394	1480	1560	1645	1710	1747	1750	1.80			
1.90	905	940	995	1082	1162	1250	1332	1414	1500	1580	1665	1725	1830	1848	1.90			
2.00	920	952	1008	1100	1178	1266	1350	1432	1513	1600	1680	1760	1840	1918	2.00			
2.50	965	1004	1055	1152	1241	1331	1420	1510	1595	1686	1715	1855	1945	2026	2.50			
3.00	1010	1048	1105	1196	1291	1385	1480	1570	1660	1750	1840	1930	2020	2108	3.00			
3.50	1040	1080	1140	1234	1334	1427	1515	1615	1705	1806	1890	1990	2080	2174	3.50			
4.00	1070	1115	1170	1266	1366	1464	1560	1665	1755	1852	1940	2040	2130	2230	4.00			
4.50	1090	1145	1205	1295	1395	1500	1595	1700	1795	1888	1980	2080	2180	2278	4.50			
5.00	1110	1160	1235	1315	1415	1525	1620	1730	1825	1924	2020	2120	2220	2318	5.00			

For values above heavy line, tension in steel is equal to 18000 lbs. per square inch.

For values below heavy lines compression in concrete is equal to 700 lbs. per square inch.

Values for other steel and concrete stresses are directly proportional to those given in

Tables I and III.

Table I gives the Extreme Fiber Stress for rectangular reinforced concrete beams for various mixtures of concrete and stresses in the steel for percentages of steel varying from plain concrete beams, to beams reinforced with as high as 5% of steel; all in accordance with the Building Ordinance Requirements for the City of Chicago.

In Table II are given in the headings the ultimate compressive strength of concrete as assumed by the Chicago Building Ordinance for various concrete mixtures. According to the theory of Mr. L. J. Mensh as published in the Journal of the American Concrete Institute for December, 1914, these compressive strengths, if introduced in the straight line formula do not agree with scientific tests on reinforced concrete beams to rupture. In order to make the straight line theory agree with the tests at rupture the ultimate extreme fiber stresses as given in Table II must be assumed instead of the values given in the headings.

The value 700 in the heading is for 1:2:4 cinder-concrete. It is also valid for stone concrete a few days old. The depth of the reinforced-concrete beams is of course assumed to be the depth to the center of the steel. Tables I, II and III assume only pure tension or compression failures. Special calculations should therefore be made for bond, shear and diagonal tension.

Table III gives the Extreme Fiber Stress for rectangular Double Reinforced concrete beams, for various percentages of tensile and compressive steel; all in accordance with the Building Ordinance Requirements for the City of Chicago. See Sec. 546-567.

ULTIMATE AND SAFE STRENGTH OF IRON AND STEEL IN POUNDS PER SQUARE INCH

Material	Compression			Safe Bearing	Shear			Modulus of Elasticity		Weight per Cu. Ft.
	Ultimate		Safe Average		Ultimate		Safe Average	Ultimate		
	From	To			From	To		From	To	
Hard Steel	36,000	40,000	18,000	26,000	45,000	55,000	12,000	28,000,000	31,000,000	490
Medium Steel	33,000	38,000	16,000	24,000	50,000	60,000	12,000	"	"	"
Steel Pins	33,000	38,000	16,000	24,000	50,000	60,000	12,000	"	"	"
Shop Rivets	24,000	29,000	16,000	24,000	50,000	60,000	12,000	"	"	"
Field Rivets	24,000	29,000	12,000	20,000	50,000	60,000	10,000	"	"	"
Cast Steel	60,000	90,000	12,000	26,000	50,000	60,000	12,000	29,000,000	32,000,000	"
Cast Iron	60,000	90,000	10,000	15,000	15,000	25,000	2,000	12,000,000	18,000,000	450

Material	Extreme Fiber Stress			Safe Average	Tension			Elastic Limit		Modulus of Resilience
	Ultimate		Safe Average		Ultimate		Safe Average	Ultimate		
	From	To			From	To		From	To	
Hard Steel	50,000	70,000	18,000	18,000	65,000	75,000	18,000	35,000	45,000	35
Medium Steel	40,000	60,000	16,000	16,000	60,000	70,000	16,000	30,000	40,000	35
Steel Pins	40,000	60,000	24,000	24,000	60,000	70,000	16,000	30,000	40,000	
Shop Rivets	40,000	60,000	24,000	24,000	48,000	58,000		24,000	30,000	
Field Rivets	40,000	60,000	18,000	18,000	46,000	54,000		24,000	30,000	
Cast Steel	60,000	90,000	16,000	16,000			18,000	35,000	50,000	
Cast Iron	30,000	40,000	3,500	3,500			3,000	10,000	20,000	1.2

BASIC SIZES OF LUMBER "AMERICAN LUMBER STANDARDS".

Dressed Sizes.

23. The terms "standard board" and "extra standard board" and "standard dimension" and "extra standard dimension" shall be the designations for 1-inch board (yard) and 2-inch dimension (yard), respectively, and applied to both softwoods and hardwoods.

24. $\frac{3}{8}$ inch, S1S or S2S (measured at standard commercially dry shipping weight and moisture content for each species), shall be the thickness for the standard yard board; $\frac{26}{32}$ inch, S1S or S2S, for the extra standard yard board.

25. $\frac{5}{8}$ inches, S1S or S2S (measured at standard commercially dry shipping weight and moisture content for each species), shall be the thickness for standard dimension not more than 12 inches wide; $1\frac{1}{4}$ inches, S1S or S2S, for extra standard dimension.

26. The finished widths of finish, boards, and dimension S1E or S2E (measured at standard commercially dry shipping weight and moisture content for each species), shall be $\frac{3}{8}$ inch off on lumber of standard widths less than 8 inches and $\frac{1}{2}$ inch off on lumber of standard widths of 8 inches and over.

27. The thicknesses and widths of finished lumber, S1S or S2S and/or S1E or S2E, shall be as follows:

Finish, Common Boards and Strips, and Dimension.

(The thicknesses apply to all widths and the widths to all thicknesses)

Product	Size, Board Measure		Dressed Dimensions at Standard Commercially Dry Shipping Weight and Moisture Content		
	Thickness	Width	Standard Thickness Yard	Standard Thickness Industrial	Standard Width
Finish	In.	In.	In.	In.	In.
.....	3	$\frac{3}{8}$	.....	2 $\frac{5}{8}$	.....
.....	4	$\frac{1}{2}$	.....	3 $\frac{1}{2}$ (c)	.....
.....	5	$\frac{5}{8}$	.....	4 $\frac{1}{2}$ (c)	.....
.....	6	$\frac{3}{4}$	.....	5 $\frac{1}{2}$ (c)	.....
.....	7	$\frac{7}{8}$	.....	2 $\frac{6}{32}$ 6 $\frac{1}{2}$ (c)	.....
.....	$1\frac{1}{4}$	8	1 $\frac{1}{8}$	7 $\frac{1}{4}$ (c)	.....
.....	$1\frac{1}{2}$	9	1 $\frac{1}{8}$	8 $\frac{1}{4}$ (c)	.....
.....	$1\frac{3}{4}$	10	1 $\frac{1}{8}$	9 $\frac{1}{4}$ (c)	.....
.....	2	11	1 $\frac{5}{8}$	1 $\frac{6}{8}$ 10 $\frac{1}{4}$ (c)	.....
.....	2 $\frac{1}{2}$	12	2 $\frac{1}{8}$	.....	11 $\frac{1}{4}$ (c)
.....	3	.....	2 $\frac{5}{8}$	.....	.....
Common boards and strips	1	3	$\frac{26}{32}$	2 $\frac{6}{32}$	2 $\frac{5}{8}$
.....	$1\frac{1}{4}$	4	1 $\frac{1}{8}$	.....	3 $\frac{3}{8}$
.....	$1\frac{1}{2}$	5	1 $\frac{1}{8}$	.....	4 $\frac{5}{8}$
.....	6	.....	.....	.....	5 $\frac{5}{8}$
.....	7	.....	.....	.....	6 $\frac{5}{8}$
.....	8	.....	.....	.....	7 $\frac{1}{2}$
.....	9	.....	.....	.....	8 $\frac{1}{2}$
.....	10	.....	.....	.....	9 $\frac{1}{2}$
.....	11	.....	.....	.....	10 $\frac{1}{2}$
.....	12	.....	.....	.....	11 $\frac{1}{2}$
Dimension and heavy joists	2	2	1 $\frac{5}{8}$	1 $\frac{6}{8}$	1 $\frac{5}{8}$
.....	2 $\frac{1}{2}$	4	2 $\frac{1}{4}$	.....	3 $\frac{5}{8}$
.....	3	6	2 $\frac{5}{8}$	.....	5 $\frac{5}{8}$
.....	4	8	3 $\frac{5}{8}$	.....	7 $\frac{1}{2}$
.....	.....	10	.....	.....	9 $\frac{1}{2}$
.....	.....	12	.....	.....	11 $\frac{1}{2}$

Siding, Flooring, Ceiling, Partition, Shiplap, and Dressed and Matched.

(The thicknesses apply to all widths and the widths to all thicknesses except as modified by the last foot note below.)

Product	Size, Board Measure		Dressed Dimensions at Standard Commercially Dry Shipping Weight and Moisture Content			
	Thickness	Width	Standard Thickness	Standard Face	Standard	Width
Bevel siding	In.	In.	In.	In.	In.	In.
.....	4	$\frac{7}{8}$ (mir.) by $\frac{3}{8}$	.....	1 $\frac{3}{8}$	3 $\frac{1}{2}$	.....
.....	5	$\frac{10}{16}$ by $\frac{3}{8}$	.....	1 $\frac{3}{8}$	4 $\frac{1}{2}$	.....
.....	6	.....	.....	.....	5 $\frac{1}{2}$	.....
Wide beveled siding	8	$\frac{7}{8}$ (mir.) by $\frac{3}{8}$	.....	1 $\frac{3}{8}$	7 $\frac{1}{4}$	.....
.....	10	$\frac{7}{8}$ by $\frac{3}{8}$	.....	1 $\frac{3}{8}$	9 $\frac{1}{4}$	.....
.....	12	$\frac{7}{8}$ by $\frac{3}{8}$	.....	1 $\frac{3}{8}$	11 $\frac{1}{4}$	.....
Rustic and drop siding (shiplapped)	4	.....	$\frac{3}{8}$	.....	3 $\frac{3}{8}$	.....
.....	5	.....	$\frac{3}{4}$	.....	4 $\frac{3}{8}$	.....
.....	6	.....	.....	.....	5 $\frac{3}{8}$	.....
.....	8	.....	.....	.....	6 $\frac{3}{8}$	.....
Rustic and drop siding (dressed and matched)	4	.....	$\frac{3}{8}$	.....	3 $\frac{3}{4}$	.....
.....	5	.....	$\frac{3}{4}$	.....	4 $\frac{3}{4}$	.....
.....	6	.....	.....	.....	5 $\frac{3}{4}$	.....
.....	8	.....	.....	.....	7	.....
Flooring	12	.....	$\frac{3}{8}$	.....	1 $\frac{1}{2}$	.....
.....	3	.....	$\frac{1}{2}$	.....	2 $\frac{3}{8}$	.....
.....	4	.....	$\frac{1}{2}$	.....	3 $\frac{3}{4}$	.....
.....	1	5	$\frac{3}{8}$	.....	4 $\frac{1}{4}$	.....
.....	$1\frac{1}{4}$	6	1 $\frac{1}{8}$	.....	5 $\frac{1}{8}$	.....
.....	$1\frac{1}{2}$	.....	1 $\frac{1}{8}$	.....	.....	.....
Ceiling	3	.....	$\frac{1}{2}$	.....	2 $\frac{3}{8}$	.....
.....	4	.....	$\frac{1}{2}$	.....	3 $\frac{3}{4}$	.....
.....	5	.....	$\frac{1}{2}$	.....	4 $\frac{1}{4}$	.....
.....	6	.....	$\frac{1}{2}$	.....	5 $\frac{3}{8}$	.....
.....	3	.....	$\frac{3}{4}$	.....	2 $\frac{3}{8}$	.....
.....	4	.....	.....	.....	3 $\frac{3}{4}$	.....
.....	5	.....	.....	.....	4 $\frac{3}{4}$	.....
.....	6	.....	.....	.....	5 $\frac{3}{8}$	.....
Shiplap	1	4	$\frac{3}{8}$	.....	3 $\frac{3}{8}$	.....
.....	6	.....	.....	.....	5 $\frac{3}{8}$	.....
.....	8	.....	.....	.....	7 $\frac{1}{8}$	.....
.....	10	.....	.....	.....	9 $\frac{1}{8}$	.....
.....	12	.....	.....	.....	11 $\frac{1}{8}$	.....
Dressed and matched	1	4	$\frac{3}{8}$	.....	3 $\frac{3}{4}$	.....
.....	$1\frac{1}{4}$	6	1 $\frac{1}{8}$	.....	5 $\frac{1}{4}$	.....
.....	$1\frac{1}{2}$	8	1 $\frac{1}{8}$	.....	7 $\frac{1}{4}$	.....
.....	.....	10	.....	.....	9 $\frac{1}{4}$	.....
.....	.....	12	.....	.....	11 $\frac{1}{4}$	.....

*Minimum $\frac{7}{16}$.

In tongued and grooved Flooring and in tongued and grooved and Shiplapped Ceiling $\frac{1}{8}$ ", $\frac{1}{4}$ ", and $\frac{1}{2}$ " thick, board measure, the tongue or lap shall be $\frac{1}{8}$ " wide, with the over-all widths $\frac{1}{8}$ " wider than the face widths shown above.

In all other patterned material, $\frac{1}{8}$ ", $\frac{3}{4}$ ", 1 ", $1\frac{1}{4}$ ", and $1\frac{1}{2}$ " thick, board measure, the tongue shall be $\frac{1}{4}$ " wide in tongued and grooved lumber, and the lap $\frac{3}{4}$ " wide in shiplapped lumber, with the over-all widths $\frac{1}{4}$ " and $\frac{3}{4}$ " wider, respectively, than the face widths shown above.

Factory Flooring, Heavy Roofing, Decking and Sheet Piling.

(The thicknesses apply to all widths and the widths to all thicknesses)

Size, Board Measure		Dressed Dimensions at Standard Commercially Dry Shipping Weight and Moisture Content			
Thickness	Width	Standard Thickness	Standard Face Width		
			D & M	Shiplapped	Grooved for Spines
Inches	Inches	Inches	Inches	Inches	Inches
2	4	1 $\frac{5}{8}$	3 $\frac{3}{8}$	3	3 $\frac{1}{2}$
2 $\frac{1}{2}$	6	2 $\frac{5}{8}$	5 $\frac{3}{8}$	5	5 $\frac{1}{2}$
3	8	2 $\frac{5}{8}$	7 $\frac{3}{8}$	7	7 $\frac{1}{2}$
4	10	3 $\frac{5}{8}$	9 $\frac{3}{8}$	9	9 $\frac{1}{2}$
.....	12	.....	11 $\frac{3}{8}$	11	11 $\frac{1}{2}$

In patterned material 2 inches and thicker, the tongue shall be $\frac{3}{8}$ inch wide in tongued-and-grooved lumber and the lap $\frac{1}{2}$ inch wide in shiplapped lumber, with the over-all widths $\frac{3}{8}$ inch and $\frac{1}{2}$ inch wider, respectively, than the face widths shown above.

ENGINEERING DESIGN FOR WOOD STRUCTURES

Recommended by the Forest Products Laboratory, United States Forest Service for Grades Complying with Basic Provisions for Structural Grades of American Lumber Standards.

NOTES ON WORKING STRESSES.

1. **THE WORKING STRESSES** in the accompanying table are recommended by the Forest Products Laboratory, U. S. Forest Service, for structural grades complying with Basic provisions for Structural Material of American Lumber Standards. In Beam and Stringer, and Post and Timber grades, stresses are given only for the species commonly cut to those sizes. Stresses for any other species can be obtained from the Forest Products Laboratory.

2. **STRUCTURAL GRADES** are developed to insure minimum strength values. The defects permitted in the Common grades provide material having not less than 60 per cent of the strength of green clear wood, and in the select grades, of 75 per cent, although in Douglas fir and Southern pine the stresses recommended in compression and in extreme fiber in bending are 80 per cent of green clear wood strength on account of the limitation on rate of growth.

3. **WORKING VALUES** are given for three conditions of exposure during use: (a) Continuously dry, (b) Occasionally wet but quickly dried, (c) More or less continuously damp or wet. Judgment should be exercised as to the values to be used in a particular case.

(a) **Continuously dry** contemplates use in interior or protected construction, not subject to conditions of excessive dampness or high humidity.

(b) **Occasionally wet** but quickly dried assumes use in such exterior structures as bridges, trestles, grandstands or bleachers, and exposed framework of open sheds.

(c) **More or less continuously damp or wet** would apply to material exposed to waves or tidewater, or in contact with earth, or used in a building in portions that would be more or less continuously wet.

4. **THE WORKING STRESS** recommended may be used without allowance for impact up to 100%.

5. **WORKING VALUES GIVEN FOR HORIZONTAL SHEAR** are maximum values. The maximum unit horizontal shear at any point in a beam as calculated is $3/2$ of the average unit shear obtained by dividing the total shear at that point by the area of the cross section.

6. **RECOGNITION OF ALL LOADS IN DESIGNING FOR MOVING LOADS**, or loads concentrated near a support, gives a calculated shearing stress higher than is actually developed. In calculating the shear at one end of a beam, the concentrated loads between this end and a point distant three times the depth of the beam from the support may be considered as acting at this point. In moving loads, as on highway

bridges or railway stringers, in computing the shear at one end it is safe to ignore all wheel loads between that end and a point three times the depth of the beam or stringer from it, when the balance of the span is assumed loaded so as to give a maximum shear stress.

7. **SHEAR STRESSES FOR JOINT DETAILS** may be taken as 50 per cent greater than the values for horizontal shear given in the table.

8. **TIMBER CONSTANTLY YIELDS UNDER LONG CONTINUED LOADING**, acquiring a permanent set. This set with a fully loaded beam is about equal to the deflection using the modulus of elasticity as given in the tables. In order to minimize the results of sag, it is advisable to use values one-half those given in the tables.

9. **THE WORKING STRESSES FOR COMPRESSION PARALLEL TO GRAIN** are for use on posts, struts, etc., with unsupported length not greater than ten times their least dimension. They are also for use in end bearing on compression members, as a short column or strut is more likely to fail at the end than at any other point in its length, and the variations in moisture content are greater there.

10. **FOR COLUMNS OF INTERMEDIATE LENGTH**, the Forest Products Laboratory finds from tests recently made that a fourth-power parabola, tangent to the Euler curve, is a conservative representation of the law controlling the strength. That is, from the short block to the long column in which the strength is dependent on stiffness, there is a falling off in ultimate strength which follows a smooth curve, very flat at first but curving sharply to become tangent to the Euler curve at two-thirds of the ultimate crushing strength.

11. **For columns from**

$$\frac{P}{A} = S \text{ to } \frac{P}{A} = \frac{2}{3} S.$$

$$\frac{P}{A} = S \left[1 - \frac{1}{3} \left(\frac{l}{Kd} \right)^4 \right]$$

Where P = Total load in pounds.

A = Area in square inches.

$\frac{P}{A}$ = Unit of compressive stress.

S = Safe stress in compression parallel to grain.

l = Unsupported length in inches.

d = Least dimension in inches.

E = Modulus of elasticity.

K = The $\frac{l}{d}$ at the point of tangency of the parabolic and Euler curves, at which

$$\frac{P}{A} = \frac{2}{3} S. \text{ The value of K for any}$$

species and grade is

$$\frac{\pi}{2} \sqrt{\frac{E}{6S}}$$

12. THE INFLUENCE OF DEFECTS ON THE COMPRESSIVE STRENGTH OF COLUMNS of constant cross section decreases as the length increases.

When $\frac{l}{d}$ equals the value of K for the

species and grade, defects such as are allowable in the grade have little influence on the strength as a column. Beyond this length the investigation of the strength of columns indicated that the Euler formula is quite accurate for long wooden columns with pin-end connections and that the maximum load is dependent upon stiffness. In such columns, a factor of safety of 3 should be applied to values of modulus of elasticity in order to obtain safe loading.

13. SQUARE END COLUMNS. The Laboratory does not, with the present data and under ordinary conditions, find justification for increasing the stresses on square-end columns over those for carefully centered pin-end columns. Tests to determine the influence of end conditions are still being made and it is probable that under special conditions higher stresses can be used.

14. FOR LONG COLUMNS, including factor of safety of 3:

$$\frac{P}{A} = \frac{\pi^2 E}{36 \left(\frac{l}{d} \right)^2}$$

15. COLUMNS SHOULD BE LIMITED IN SLENDERNESS to $\frac{l}{d} = 50$.

16. FOR DIRECT TENSION the same values as for extreme fiber stress in bending may be used. Straight grained wood has greater resistance to tension than to any other kind of stress. It has been found, however, practically impossible to design joints that will develop anywhere nearly the full tensile strength.

17. GRADES OF JOISTS OR BEAMS may be used for members in direct tension, as in bottom chords of trusses, increase in size of defects towards ends being permissible because of the gradual application of stresses through splice plates or end connections.

18. THE PROVISIONS OF THE JOIST AND PLANK GRADE are such that working stresses for these grades may be applied to material used with the wide faces vertical or horizontal. In material 5-inch and thicker with loads applied to the wide face, the knot requirements for this face are those for the narrow face as given in the rules.

19. WHERE WORKING STRESSES IN BENDING ARE REQUIRED FOR CAPS, BRIDGE TIES, ETC., they should be graded on Beam and Stringer grades, but as such material is often square or has horizontal faces wider than the vertical faces, in contrast to beams and stringers, in which the

narrow faces are horizontal faces and the wide faces are vertical, care should be exercised that the knot limitations are applied to the proper faces.

20. IN RAILWAY STRINGERS OF TWO SPANS LENGTH, DEFECTS THROUGHOUT THE CENTER TWO-THIRDS SHOULD BE LIMITED as in the center third of a single span stringer, for the maximum moment will be over the center support and although the full positive moment would not be developed in either span as long as there was resistance to negative moment over the center support, there might be circumstances in which full positive moment of resistance at the centers of the two spans would be desirable.

21. IN DETERMINING WORKING STRESSES the Forest Products Laboratory has considered both elastic limit and breaking strength. Elastic limit, however, is more variable and less definite than ultimate strength, and the latter is taken as the more dependable basis for the determination of safe working stresses.

22. THE FACTOR OF SAFETY AT A GIVEN WORKING STRESS VARIES MATERIALLY WITH THE DURATION OF THE STRESS. At the recommended working stresses, the average timber in buildings has a factor of safety of 6 on impact loading, 4 under 5-minute loads and $2\frac{1}{4}$ under long-time loading, with a minimum factor of safety of 2 on 75 per cent of the pieces under long-time loading, while about one piece in 100, of very light weight and with maximum defects for the grade, would be expected to break at $1\frac{1}{2}$ times the recommended stress under loading of approximately 10 years' duration. The factor of safety on new timbers in bridge work is about $1\frac{1}{7}$ greater than the above values.

23. WORKING STRESSES ARE BASED ON THE STRENGTH OF THE CLEAR WOOD of the various species and, in some properties, on grade as fixed by limitation on size and location of knots, extent of shake and checks, and extent of cross grain, on conditions of exposure during use, and on size of piece. In southern pine and Douglas fir, working stresses in some properties are increased for limitation on rate of growth and for requirement of percentage of summerwood.

24. WORKING STRESSES FOR EXTREME FIBER IN BENDING are varied with grade, extent of exposure and size of piece; in horizontal shear, they are varied with grade; in compression parallel to grain, with grade and exposure; in compression perpendicular to grain, with exposure.

25. WORKING STRESSES IN SHEAR are not varied with size or extent of exposure; in compression parallel to grain they are not varied with size; in compression perpendicular to grain they are not varied with grade or size; in modulus of elasticity they are taken as the same in all grades.

26. **IN SOUTHERN PINE AND DOUGLAS FIR, WORKING STRESSES** in extreme fiber in bending, compression parallel to grain and compression perpendicular to grain, in any grade, may be increased 1/15 for material of close grain, or 1/6 for dense mate-

rial, over material not so selected. Values in these species in shear may be increased $1/6$ for dense material, but not for limitation on rate of growth. Modulus of elasticity is not varied with these properties.

27. VARIATION IN WORKING STRESSES.

x varies with

— does not vary with

Property	Governing Defects	Conditions of Exposure	Grade	Size of Piece	Rate of Growth	Density
Extreme Fiber in Bending .	Knots and Slope of Grain	x	x	x*	x	x
Horizontal Shear	Shake and Checks	—	x	—	—	x
Compression Parallel	Knots and Slope of Grain	x	x	—	x	x
Compression Perpendicular		x	—	—	x	x
Modulus of Elasticity ..		—	—	—	—	—

* Dry Location only.

WORKING STRESSES IN POUNDS PER SQUARE INCH FOR POSTS AND TIMBERS,

6"x6" AND LARGER.

CONTINUOUSLY DRY.

Select Grade.

SPECIES	RATIO OF LENGTH TO LEAST DIMENSION (L/D)											MODULUS OF ELASTICITY
	10	12	14	16	18	20	25	30	35	40	50	
Cedar, Western Red.....	700	686	674	656	629	592	438	304	224	171	110	1,000,000
Douglas Fir, Coast Region: Select.....	1175	1149	1127	1093	1045	975	702	487	358	274	175	1,600,000
Dense Select.....	1285	1251	1222	1176	1112	1022	702	487	358	274	175	1,600,000
Rocky Mountain Region.....	800	786	774	753	726	688	526	365	268	206	132	1,200,000
Hemlock, West Coast.....	900	885	872	852	823	783	614	426	313	240	153	1,400,000
Larch, Western.....	1100	1068	1041	999	937	851	570	396	291	223	142	1,300,000
Pine, Southern: Select.....	1175	1149	1127	1093	1045	975	702	487	358	274	175	1,600,000
Dense Select.....	1285	1251	1222	1176	1112	1022	702	487	358	274	175	1,600,000
Redwood.....	1000	972	947	910	856	781	526	365	268	206	132	1,200,000
Spruce, Red, White, Sitka.....	800	786	774	753	726	688	526	365	268	206	132	1,200,000

Common Grade.

Cedar, Western Red.....	560	553	547	538	524	505	425	304	224	171	110	1,000,000
Douglas Fir, Coast Region.....	880	870	861	847	826	796	675	487	358	274	175	1,600,000
Rocky Mountain Region.....	640	632	627	617	602	582	500	365	268	206	132	1,200,000
Hemlock, West Coast.....	720	712	706	696	680	660	573	426	313	240	153	1,400,000
Larch, Western.....	880	863	849	828	798	752	570	396	291	223	142	1,300,000
Pine, Southern.....	880	870	861	847	826	796	675	487	358	274	175	1,600,000
Redwood.....	800	786	773	754	726	688	526	365	268	206	132	1,200,000
Spruce, Red, White, Sitka.....	640	632	627	617	602	582	500	365	268	206	132	1,200,000

WORKING STRESSES IN POUNDS PER SQUARE INCH FOR POSTS AND TIMBERS.

6"x6" AND LARGER.

OCCASIONALLY WET BUT QUICKLY DRIED.

Select Grade.

SPECIES	RATIO OF LENGTH TO LEAST DIMENSION (L/D)											MODULUS OF ELASTICITY
	10	12	14	16	18	20	25	30	35	40	50	
Cedar, Western Red	700	686	673	654	626	588	438	304	224	171	110	1,000,000
Douglas Fir, Coast Region: Select	1065	1045	1028	1003	968	915	702	487	358	274	175	1,600,000
Dense Select	1165	1139	1118	1083	1036	967	702	487	358	274	175	1,600,000
Rocky Mountain Region	800	785	772	753	728	688	526	365	268	206	132	1,200,000
Hemlock, West Coast	900	885	871	851	824	783	612	426	313	240	153	1,400,000
Larch, Western	1000	976	955	922	877	810	570	396	291	223	142	1,300,000
Pine, Southern: Select	1065	1045	1028	1003	968	915	702	487	358	274	175	1,600,000
Dense Select	1165	1139	1118	1083	1036	967	702	487	358	274	175	1,600,000
Redwood	900	879	861	834	794	738	526	365	268	206	132	1,200,000
Spruce, Red, White, Sitka	750	738	728	712	690	660	525	365	268	206	132	1,200,000

Common Grade.

Cedar, Western Red	560	552	546	537	523	504	425	304	224	171	110	1,000,000
Douglas Fir, Coast Region	800	792	784	773	758	736	644	487	358	274	175	1,600,000
Rocky Mountain Region	640	632	625	616	602	582	502	365	268	206	132	1,200,000
Hemlock, West Coast	720	712	705	695	681	659	572	426	313	240	153	1,400,000
Larch, Western	800	787	777	760	736	704	564	396	291	223	142	1,300,000
Pine, Southern	800	792	784	773	758	736	644	487	358	274	175	1,600,000
Redwood	720	709	700	685	666	637	518	365	268	206	132	1,200,000
Spruce, Red, White, Sitka	600	594	588	580	568	552	483	365	268	206	132	1,200,000

MORE OR LESS CONTINUOUSLY DAMP OR WET.

Select Grade.

SPECIES	RATIO OF LENGTH TO LEAST DIMENSION (L/D)											MODULUS OF ELASTICITY
	10	12	14	16	18	20	25	30	35	40	50	
Cedar, Western Red	650	638	629	614	594	565	442	304	224	171	110	1,000,000
Douglas Fir, Coast Region: Select	905	893	883	867	846	814	683	487	358	274	175	1,600,000
Dense Select	990	974	961	940	910	871	698	487	358	274	175	1,600,000
Rocky Mountain Region	700	690	681	669	651	623	514	365	268	206	132	1,200,000
Hemlock, West Coast	800	789	780	766	745	717	600	426	313	240	153	1,400,000
Larch, Western	800	787	776	760	736	704	560	396	291	223	142	1,300,000
Pine, Southern: Select	905	893	883	867	846	814	683	487	358	274	175	1,600,000
Dense Select	990	974	961	940	910	871	698	487	358	274	175	1,600,000
Redwood	750	737	727	712	690	660	525	365	268	206	132	1,200,000
Spruce, Red, White, Sitka	650	642	635	625	611	589	500	365	268	206	132	1,200,000

Common Grade.

Cedar, Western Red	520	514	509	502	491	475	413	304	224	171	110	1,000,000
Douglas Fir, Coast Region	680	675	670	664	655	641	588	482	358	274	175	1,600,000
Rocky Mountain Region	560	554	551	544	535	521	465	365	268	206	132	1,200,000
Hemlock, West Coast	640	634	629	622	612	598	537	426	313	240	153	1,400,000
Larch, Western	640	633	627	618	606	588	515	396	291	223	142	1,300,000
Pine, Southern	680	675	670	664	655	641	588	482	358	274	175	1,600,000
Redwood	600	594	588	580	568	552	483	365	268	206	132	1,200,000
Spruce, Red, White, Sitka	520	515	512	507	500	489	446	365	268	206	132	1,200,000

**WORKING STRESSES IN POUNDS PER SQUARE INCH FOR JOIST AND PLANK,
BEAMS AND STRINGERS.**

CONTINUOUSLY DRY.

Select Grade.

SPECIES	EXTREME FIBER IN BENDING	COMPRESSION PERPENDICULAR TO GRAIN	MAXIMUM HORIZONTAL SHEAR	MODULUS OF ELASTICITY
Cedar, Western Red.....	900	200	80	1,000,000
Northern and Southern White.....	750	175	70	800,000
Port Orford.....	1100	250	90	1,200,000
Alaska.....	1100	250	90	1,200,000
Cypress, Southern.....	1300	350	100	1,200,000
Douglas Fir, Coast Region: Select.....	1600	345	90	1,600,000
Dense Select.....	1750	380	105	1,600,000
Rocky Mountain Region.....	1100	275	85	1,200,000
Fir, Balsam.....	900	150	70	1,000,000
Golden, Noble, Silver, White.....	1100	300	70	1,100,000
Hemlock, West Coast.....	1300	300	75	1,400,000
Eastern.....	1100	300	70	1,100,000
Larch, Western.....	1200	325	100	1,300,000
Pine, Southern: Select.....	1600	345	110	1,600,000
Dense Select.....	1750	380	128	1,600,000
California, Idaho and Northern White,				
Pondosa and Sugar.....	900	250	85	1,000,000
Norway.....	1100	300	85	1,200,000
Redwood.....	1200	250	70	1,200,000
Spruce, Red, White, Sitka.....	1100	250	85	1,200,000
Englemann.....	750	175	70	800,000
Tamarack, Eastern.....	1200	300	95	1,300,000

Common Grade.

Cedar, Western Red.....	720	200	64	1,000,000
Northern and Southern White.....	600	175	56	800,000
Port Orford.....	880	250	72	1,200,000
Alaska.....	880	250	72	1,200,000
Cypress, Southern.....	1040	350	80	1,200,000
Douglas Fir, Coast Region.....	1200	325	72	1,600,000
Rocky Mountain Region.....	880	275	68	1,200,000
Fir, Balsam.....	720	150	56	1,000,000
Golden, Noble, Silver, White.....	880	300	56	1,100,000
Hemlock, West Coast.....	1040	300	60	1,400,000
Eastern.....	880	300	56	1,100,000
Larch, Western.....	960	325	80	1,300,000
Pine, Southern.....	1200	325	88	1,600,000
California, Idaho and Northern White,				
Pondosa and Sugar.....	720	250	68	1,000,000
Norway.....	880	300	68	1,200,000
Redwood.....	960	250	56	1,200,000
Spruce, Red, White, Sitka.....	880	250	68	1,200,000
Englemann.....	600	175	56	800,000
Tamarack, Eastern.....	960	300	76	1,300,000

**WORKING STRESSES IN POUNDS PER SQUARE INCH FOR JOISTS, PLANK
BEAMS AND STRINGERS.**

MORE OR LESS CONTINUOUSLY DAMP OR WET.

Select Grade.

SPECIES	EXTREME FIBER IN BENDING		COMPRESSION PERPENDICULAR TO GRAIN	MAXIMUM HORIZONTAL SHEAR	MODULUS OF ELASTICITY
	4" and Thinner	5" and Thicker			
Cedar, Western Red.....	670	750	125	80	1,000,000
Northern and Southern White.....	530	...	100	70	800,000
Port Orford.....	800	900	150	90	1,200,000
Alaska.....	800	...	150	90	1,200,000
Cypress, Southern.....	800	...	225	100	1,200,000
Douglas Fir, Coast Region: Select.....	950	1065	215	90	1,600,000
Dense Select.....	1050	1165	235	105	1,600,000
Rocky Mountain Region.....	620	700	200	85	1,200,000
Fir, Balsam.....	530	...	100	70	1,000,000
Golden, Noble, Silver, White.....	710	...	200	70	1,100,000
Hemlock, West Coast.....	800	900	200	75	1,400,000
Eastern.....	710	...	200	70	1,100,000
Larch, Western.....	800	900	200	100	1,300,000
Pine, Southern: Select.....	950	1065	215	110	1,600,000
Dense Select.....	1050	1165	235	128	1,600,000
California, Idaho and Northern White, Pondosa and Sugar.....	670	...	125	85	1,000,000
Norway.....	710	...	150	85	1,200,000
Redwood.....	710	800	125	70	1,200,000
Spruce, Red, White, Sitka.....	710	800	125	85	1,200,000
Englemann.....	440	...	100	70	800,000
Tamarack, Eastern.....	800	...	200	95	1,300,000

Common Grade.

Cedar, Western Red.....	570	600	125	64	1,000,000
Northern and Southern White.....	450	...	100	56	800,000
Port Orford.....	680	720	150	72	1,200,000
Alaska.....	680	...	150	72	1,200,000
Cypress, Southern.....	680	...	225	80	1,200,000
Douglas Fir, Coast Region.....	750	800	200	72	1,600,000
Rocky Mountain Region.....	530	560	200	68	1,200,000
Fir, Balsam.....	450	...	100	56	1,000,000
Golden, Noble, Silver, White.....	600	...	200	56	1,100,000
Hemlock, West Coast.....	680	720	200	60	1,400,000
Eastern.....	600	...	200	56	1,100,000
Larch, Western.....	680	720	200	80	1,300,000
Pine, Southern.....	750	800	200	88	1,600,000
California, Idaho and Northern White, Pondosa and Sugar.....	570	...	125	68	1,000,000
Norway.....	600	...	150	68	1,200,000
Redwood.....	600	640	125	56	1,200,000
Spruce, Red, White, Sitka.....	600	640	125	68	1,200,000
Englemann.....	370	...	100	56	800,000
Tamarack, Eastern.....	680	...	200	76	1,300,000

**WORKING STRESSES IN POUNDS PER SQUARE INCH FOR JOISTS, PLANK
BEAMS AND STRINGERS—CONTINUED.**

OCCASIONALLY WET BUT QUICKLY DRIED.

Select Grade.

SPECIES	EXTREME FIBER IN BENDING		COMPRESSION PERPENDICULAR TO GRAIN	MAXIMUM HORIZONTAL SHEAR	MODULUS OF ELASTICITY
	4" and Thinner	5" and Thicker			
Cedar, Western Red.....	710	800	150	80	1,000,000
Northern and Southern White.....	580	...	140	70	800,000
Port Orford.....	890	1000	200	90	1,200,000
Alaska.....	890	...	200	90	1,200,000
Cypress, Southern.....	980	...	250	100	1,200,000
Douglas Fir, Coast Region: Select.....	1240	1385	240	90	1,600,000
Dense Select.....	1370	1515	265	105	1,600,000
Rocky Mountain Region.....	800	900	225	85	1,200,000
Fir, Balsam.....	670	...	125	70	1,000,000
Golden, Noble, Silver, White.....	800	...	225	70	1,100,000
Hemlock, West Coast.....	980	1100	225	75	1,400,000
Eastern.....	800	...	225	70	1,100,000
Larch, Western.....	980	1100	225	100	1,300,000
Pine, Southern: Select.....	1240	1385	240	110	1,600,000
Dense Select.....	1370	1515	265	128	1,600,000
California, Idaho and Northern White					
Pondosa and Sugar.....	710	...	150	85	1,000,000
Norway.....	890	...	175	85	1,200,000
Redwood.....	890	1000	150	70	1,200,000
Spruce, Red, White, Sitka.....	800	900	150	85	1,200,000
Englemann.....	580	...	140	70	800,000
Tamarack, Eastern.....	980	...	225	95	1,300,000

Common Grade.

Cedar, Western Red.....	600	640	150	64	1,000,000
Northern and Southern White.....	490	...	140	56	800,000
Port Orford.....	760	800	200	72	1,200,000
Alaska.....	760	...	200	72	1,200,000
Cypress, Southern.....	830	...	250	80	1,200,000
Douglas Fir, Coast Region.....	980	1040	225	72	1,600,000
Rocky Mountain Region.....	680	720	225	68	1,200,000
Fir, Balsam.....	570	...	125	56	1,000,000
Golden, Noble, Silver, White.....	680	...	225	56	1,100,000
Hemlock, West Coast.....	830	880	225	60	1,400,000
Eastern.....	680	...	225	56	1,100,000
Larch, Western.....	830	880	225	80	1,300,000
Pine, Southern.....	980	1040	225	88	1,600,000
California, Idaho and Northern White,					
Pondosa and Sugar.....	600	...	150	68	1,000,000
Norway.....	760	...	175	68	1,200,000
Redwood.....	760	800	150	56	1,200,000
Spruce, Red, White, Sitka.....	680	720	150	68	1,200,000
Englemann.....	490	...	140	56	800,000
Tamarack, Eastern.....	830	...	225	76	1,300,000

RECOMMENDATIONS FOR THE DESIGN OF HOOPED COLUMNS.

Concrete 1:2:4.
Rods round— $\frac{1}{2}$ "^o to $1\frac{1}{4}$ "^o.
Core diameter 4" less than column diameter.

As few different sizes of columns as possible.

Column diameter never less than $\frac{1}{12}$ th the story height.

Percentage of vertical steel from 1% to 7%.

Percentage of hooping steel from 0.5% to 1.5%.

Maximum pitch of spiral $\frac{1}{10}$ th of core diameter, or 3".

Minimum pitch of spiral $1\frac{1}{2}$ ".

Maximum size of spiral steel $\frac{1}{2}$ "^o.

Minimum size of spiral steel $\frac{3}{16}$ "^o.

Maximum spacing of vertical steel 9" or $\frac{1}{8}$ circumference of column.

Minimum spacing of vertical steel $3\frac{1}{2}$ ".

Minimum lap of vertical steel 18".

Lap of vertical steel for average core stresses less than 1000 #"—25 diameters.

Lap of vertical steel for average core stresses greater than 1000 #"—30 diameters.
Length of plain round stub bars in footings, 60 diameters.

Length of square twisted stub bars in footings, 40 diameters.

Stub bars embedded one-half their length in footing and one-half in column.

Length of spirals to be clear story height with one extra turn at top and bottom.

3 vertical lines of spacers for all spirals under 18" diameter.

4 vertical lines of spacers for all spirals over 18" diameter.

When columns require a large percentage of vertical steel it is often more economical to use a structural steel column and encase it in concrete. It must be remembered that the working stress of reinforcing steel is only (nxf_c) while that of a structural col-

umn encased in concrete is $18000 - 70 \frac{1}{r}$.

Metric Tables.

	Approximate Equivalent.		Accurate Equivalent.
1 inch	[length].. $2\frac{1}{2}$	cubic centimeters	2.539
1 centimeter	0.4	inch	0.393
1 yard	1	meter	0.914
1 meter (39.37 inches)	1	yard	1.093
1 foot	30	centimeters	30.479
1 kilometer (1,000 meters)	$\frac{1}{2}$	mile	0.621
1 mile	$1\frac{1}{2}$	kilometers	1.600
1 gramme	[weight].. $15\frac{1}{2}$	grains	15.432
1 grain	0.064	gramme	0.064
1 kilogramme (1,000 grammes)	2.2	pounds avoirdupois	2.204
1 pound avoirdupois	$\frac{1}{2}$	kilogramme	0.453
1 ounce avoirdupois (437 $\frac{1}{2}$ grains)	28 $\frac{1}{3}$	grammes	28.349
1 ounce troy, or apothecary (480 grains)	31	grammes	31.103
1 cubic centimeter	[bulk].. 1.06	cubic inch	1.060
1 cubic inch	16 $\frac{1}{3}$	cubic centimeters	16.386
1 liter (1,000 cubic centimeters)	1	U. S. standard quart	0.946
1 United States quart	1	liter	1.057
1 fluid ounce	29 $\frac{1}{2}$	cubic centimeters	29.570
1 hectare (10,000 square meters)	[surface].. $2\frac{1}{2}$	acres	2.471
1 acre	0.4	hectare	0.40

In the nickel five-cent piece of our coinage is a key to the tables of linear measures and weights. The diameter of this coin is two centimeters, and its weight is five grammes. Five of them placed in a row will give the length of the decimeter, and two of them will weigh a decagram. As the kiloliter is a cubic meter, the key to the measure of length is also the key to the measure of capacity.

Handy Table.

Diameter of a circle $\times 3.1416$ = circumference.
Radius of a circle $\times 6.283185$ = circumference.
Square of the diameter of a circle $\times 0.7854$ = area.
Square of the circumference of a circle $\times 0.07958$ = area.
Half the circumference of a circle \times half its diameter = area.
Circumference of a circle $\times 0.159155$ = radius.
Square root of the area of a circle $\times 0.56419$ = radius.
Circumference of a circle $\times 0.31831$ = diameter.
Square root of the area of a circle $\times 1.12838$ = diameter.
Diameter of a circle $\times 0.86$ = side of inscribed equilateral triangle.
Diameter of a circle $\times 0.7071$ = side of an inscribed square.
Circumference of a circle $\times 0.225$ = side of an inscribed square.
Circumference of a circle $\times 0.282$ = side of an equal square.
Diameter of a circle $\times 0.8862$ = side of an equal square.
Base of a triangle $\times \frac{1}{2}$ the altitude = area.
Multiplying both diameters and .7854 together = area of an ellipse.
Surface of a sphere $\times \frac{1}{6}$ of its diameter = solidity.

Circumference of a sphere \times its diameter = surface.
Square of the diameter of a sphere $\times 3.1416$ = surface.
Square of the circumference of a sphere $\times 0.3183$ = surface.
Cube of the diameter of a sphere $\times 0.5236$ = solidity.
Cube of the radius of a sphere $\times 4.1888$ = solidity.
Cube of the circumference of a sphere $\times 0.016887$ = solidity.
Square root of the surface of a sphere $\times 0.56419$ = diameter.
Square root of the surface of a sphere $\times 1.772454$ = circumference.
Cube root of the solidity of a sphere $\times 1.2407$ = diameter.
Cube root of the solidity of a sphere $\times 3.8978$ = circumference.
Radius of a sphere $\times 1.1547$ = side of inscribed cube.
Square root of ($\frac{1}{3}$ of the square of) the diameter of a sphere = side of inscribed cube.
Area of its base $\times \frac{1}{3}$ of its altitude = solidity of a cone or pyramid, whether round, square, or triangular.
Area of one of its sides $\times 6$ = surface of a cube.
Altitude of trapezoid $\times \frac{1}{2}$ the sum of its parallel sides = area.

Square root of ($\frac{1}{3}$ of the square of) the diameter of a sphere = side of inscribed cube.

Area of its base $\times \frac{1}{3}$ of its altitude = solidity of a cone or pyramid, whether round, square, or triangular.

Area of one of its sides $\times 6$ = surface of a cube.

Altitude of trapezoid $\times \frac{1}{2}$ the sum of its parallel sides = area.

TABLE OF SQUARE ROOTS.

No.	Sq. Root.	No.	Sq. Root.	No.	Sq. Root.	No.	Sq. Root.
25	5.	650	25.46	1400	37.42	2600	50.99
50	7.071	700	26.46	1450	38.08	2700	51.96
75	8.66	750	27.39	1500	38.73	2800	52.91
100	10.00	800	28.28	1550	39.37	2900	53.85
125	11.18	850	29.15	1600	40.00	3000	54.77
150	12.25	900	30.00	1650	40.62	3200	56.57
175	13.23	950	30.82	1700	41.23	3400	58.30
200	14.14	1000	31.62	1800	42.43	3600	60.00
250	15.81	1050	32.40	1900	43.59	3800	61.64
300	17.32	1100	33.16	2000	44.72	4000	63.24
350	18.70	1150	33.91	2100	45.82	4200	64.80
400	20.00	1200	34.64	2200	46.90	4400	66.32
450	21.21	1250	35.36	2300	47.95	4600	67.82
500	22.36	1300	36.06	2400	48.99	4800	69.28
550	23.45	1350	36.74	2500	50.00	5000	70.72
600	24.49						

Expansion of Water (Dalton).

Temperature.	Expansion.	Temperature.	Expansion.	Temperature.	Expansion.
22°	1.0009	72°	1.0018	152°	1.01934
32	1	92	1.00477	172	1.02575
*46	1	112	1.0088	192	1.03265
52	1.00021	132	1.01367	212	1.0466

*Greatest density at 59.1° Fahr.

Capacity of Bins and Boxes.

A box 24 inches long by 16 inches wide and 28 inches deep will contain a barrel, or three bushels; 24 by 16 inches and 14 inches deep contains half a barrel; 16 inches square and 8 $\frac{1}{2}$ inches deep will contain one bushel; 16 by 8 $\frac{1}{2}$ inches and 8 inches deep will contain half a bushel; 8 by 8 $\frac{1}{2}$ inches and 8 inches deep will contain one peck; 8 inches square and 4 $\frac{1}{2}$ inches deep will contain one gallon; 7 by 4 inches and 4 $\frac{1}{2}$ inches deep will contain half a gallon; 4 inches square and 4 $\frac{1}{2}$ inches deep will contain one quart; 4 feet long, 3 feet 5 inches wide and 2 feet 8 inches deep will contain one ton of coal, or 36 cubic feet.

Dimensions of a Barrel.—Diameter of head, 17 inches; bung, 19 inches; length, 28 inches; volume, 7,680 cubic inches.

Table Showing the Pressure of Water at Different Elevations.

Feet Head	Equals Pressure per Square Inch	Feet Head	Equals Pressure per Square Inch	Feet Head	Equals Pressure per Square Inch	Feet Head	Equals Pressure per Square Inch	Feet Head	Equals Pressure per Square Inch
1	43	65	28.15	130	56.31	195	84.47	260	112.62
5	2 16	70	30.32	135	58.48	200	86.63	265	114.79
10	4 33	75	32.48	140	60.64	205	88.80	270	116.96
15	6 49	80	34.65	145	62.81	210	90.96	275	119.12
20	8 66	85	36.82	150	64.97	215	93.14	280	121.29
25	10 82	90	38.98	155	67.14	220	95.30	285	123.45
30	12 99	95	41.15	160	69.31	225	97.49	290	125.62
35	15 16	100	43.31	165	71.47	230	99.63	295	127.78
40	17 32	105	45.48	170	73.64	235	101.79	300	129.95
45	19 49	110	47.64	175	75.80	240	103.96	310	134.28
50	21 65	115	49.81	180	77.97	245	106.13	320	138.62
55	23 82	120	51.98	185	80.14	250	108.29	330	142.95
60	25 99	125	54.15	190	82.30	255	110.46	340	147.28

For an exhaustive discussion of live loads in buildings send for "Report of Building Code Committee," Nov. 1, 1924, U. S. Dept. of Commerce entitled "Minimum Live Loads Allowable for Use in Design of Buildings." This report gives tables tabulating almost every kind of building occupancy.

Weights of Materials. Dry Woods.

	Lbs. Board ft.	Lbs. Cubic ft.		Lbs. Board ft.	Lbs. Cubic ft.
Apple	4.1	49.	Iron Wood	6.	71.
Ash, American white	3.9	47.	Larch	3.	35.
Birch	3.9	45.	Lignum Vite	6.9	83.
Beech	3.7	43.	Mahogany, Honduras	2.9	35.
Boxwood	5.	60.	Mahogany, Spanish	4.4	53.
Cedar, American	2.9	35.	Maple	4.1	49.
Cedar, W. Indian	3.9	47.	Maple, soft	3.5	42.
Cedar, Lebanon	2.5	30.	Oak, live	4.9	59.3
Cherry	3.5	42.	Oak, red	3.9	45.
Chestnut	3.4	41.	Oak, white	4.3	52.
Cork	1.3	15.	Pine, Southern	3.7	45.
Elm	2.9	35.	Pine, white	2.1	25.
Ebony	6.3	76.1	Pine, yellow	2.8	34.3
Hemlock	2.1	25.	Spruce	2.1	25.
Hickory	4.4	53.	Sycamore	3.1	37.
Hornbeam	2.9	47.	Walnut	3.2	38.

Building Materials—Stacked.

	Lbs. per cubic ft.		Lbs. per cubic ft.
Brick—pressed	150	Glass—window	157
" common	125	Granite	170
" soft	100	Lime—quick	53
Cement—Portland	100	Plaster of Paris	70
Cement—Rosendale	56	Sand	90-106
Cinders—dry	72	Sandstone	151
Cinders—packed	90	Shale	162
Earth—dry, shaken	82- 92	Slate	175
Earth—rammed	92-100	Trap rock	187

Masonry.

	Lbs. per cubic ft.		Lbs. per cubic ft.
Brick—pressed or paving	140	Granite	160
Brick—hard, common	120	Mortar and plaster	120
Brick—soft	100	Rubble—limestone, common	140
Brick—hollow	90	Rubble—limestone, cut face	150
Concrete—stone	150	Rubble—sandstone, common	140
Concrete—cinder	96	Rubble—sandstone, cut face	150

Standard Load-Bearing Wall Tile.

End construction:	Number of cells	Weight, each lbs.	Side construction:	Number of cells	Weight, each lbs.
3¾ by 12 by 12	3	20	3¾ by 5 by 12	1	9
6 by 12 by 12	6	30	8 by 5 by 12	2	16
8 by 12 by 12	6	36	8 by 5 by 12 ("L" shaped)	4	16
10 by 12 by 12	6	42	8 by 6¾ by 12 ("T" shaped)	4	16
12 by 12 by 12	6	48	8 by 7¾ by 12 (square)	6	24
			8 by 10¾ by 12 ("H" shaped)	7	32

Standard Partition Tile.

	Number of cells	Weight, each lbs.		Number of cells	Weight, each lbs.
3 by 12 by 12	3	15	8 by 12 by 12	4	30
4 by 12 by 12	3	16	10 by 12 by 12	4	36
6 by 12 by 12	3	22	12 by 12 by 12	4	40

Standard Split Furring Tile.

	Number of cells	Weight, each lbs.
2 by 12 by 12	9	9

Standard Book Tile.

	Lbs. per sq. ft.
3 by 12 by 18 to 24	18

Building Materials—In Construction.

Roofing.

	Lbs. per square ft.		Lbs. per square ft.
Copper—sheet	0.75 to 1.25	Shingles—wood 16"	2
Felt and gravel	8 to 10	Singles—wood 16"	2
Iron—corrugated	1 to 3.75	Slate—average	10
Iron—galvanized	1 to 3	Tile—fancy, laid in mortar	25 to 30
Iron—sheet, black, painted	1.5	Tile—plain, average	12
Ready composition roofing	1 to 1.5	Tin and paint	1
Sheet lead	4 to 8	Zinc	1 to 2

Floors.

	l.bs. per sq. ft.		Lbs. per sq. ft.
Flat arches (tile) 3" thick	17	Flat arches (tile) 12" thick	39
" " " 4" "	18	" " " 14" "	43
" " " 6" "	25	" " " 16" "	49
" " " 8" "	31	Book tile 2" thick	15
" " " 10" "	35	" " 3" "	17
Brick arches 4" thick and concrete	70	Beam tile	15

Table for Weights of Yellow Pine Joists, Studs and Rafters on the Assumption That One Board Foot of Y. P. Weighs 2.8 Pounds.

Spacing	Size	Weight per Sq. Foot	Size	Weight Per Sq. Foot	Size	Weight
12"	2"x4"	1.87	2"x6"	2.8	2"x8"	3.74
14"	"	1.60	"	2.4	"	3.20
16"	"	1.40	"	2.1	"	2.80
18"	"	1.25	"	1.87	"	2.50
20"	"	1.12	"	1.68	"	2.24
22"	"	1.02	"	1.53	"	2.04
12"	2"x10"	4.68	2"x12"	5.61	2"x14"	6.55
14"	"	4.00	"	4.80	"	5.60
16"	"	3.50	"	4.20	"	4.90
18"	"	3.13	"	3.75	"	4.38
20"	"	2.80	"	3.36	"	3.92
22"	"	2.55	"	3.06	"	3.57

Partitions.

	Lbs. per sq. ft.		Lbs. per sq. ft.
Gypsum partition blocks 3" thick....	10	Partition tile 3" thick.....	17
" " " 4" "	12	" " 4" "	18
" " " 5" "	14	" " 6" "	25
" " " 6" "	16	" " 8" "	31
Plaster on brick, tile or concrete....	5	" " 10" "	35

Ceiling.

	Lbs. per sq. ft.
Lath and plaster 2 coats.....	9
Lath and plaster 3 coats.....	10
Suspended ceiling	10

Sheathing, Flooring, etc.

	Lbs. per sq. ft.
Pine, Hemlock, Spruce, Poplar, Red-wood, per inch thick.....	3
Chestnut, Maple	4

Weight per Square Foot of Sheet Lead.

1/62 inch thick.....	2 lbs.	1/10 inch thick.....	7 lbs.
3/64 " "	2 1/2 "	1/8 " "	8 "
1/25 " "	3 "	5/32 " "	10 "
1/16 " "	4 "	3/16 " "	12 "
1/14 " "	5 "	7/32 " "	14 "
1/12 " "	6 "	1/4 " "	16 "

Miscellaneous Items.

	Lbs. per sq. ft.		Lbs. per sq. ft.
While the following items vary considerably in weight, the values given below are fair averages and may be used for preliminary computations.		Wood stair construction	20
		Sidewalk lights in concrete.....	30
		Reinforcement of concrete	6
Iron stair construction	50	Steel joists per sq. ft. of floor....	6
Concrete stair construction	150	Steel girders per sq. ft. of floor....	4

Contents of Storage Warehouses.

	Weight per Cu. ft.	Allowable Height of Pile in ft.		Weight per Cu. ft.	Allowable Height of Pile in ft.
Material.			Wool—worsted, in cases..	27	8
Groceries Etc.			Hardware, Etc.		
Beans—in bags	40	8	Sheet tin—in boxes.....	278	2
Canned goods—cases	58	6	Wire—insulated copper, in coils	63	5
Coffee—roasted, in bags....	33	8	Wire—galvanized iron, in coils	74	4.5
Coffee—green, in bags....	39	8	Wire—magnet, on spools..	75	6
Flour—in barrels	40	5	Drugs, Paints, Oils, Etc.		
Molasses—in barrels.....	48	5	Glycerine—in cases.....	52	6
Rice—in bags	58	6	Linseed oil—in bbls....	36	6
Sal Soda—in barrels.....	46	5	Logwood extract—in boxes	70	5
Salt—in bags	70	5	Rosin—in bbls.....	48	6
Soap powder—in cases....	38	8	Shellac—gum	38	6
Starch—in barrels	25	6	Soda — Caustic, in iron drums	88	3.33
Sugar—in barrels	43	5	Soda—Silicate, in bbls....	53	6
Sugar—in cases	51	6	Sulphuric Acid	60	1.66
Tea—in chests	25	8	White Lead Paste—in cans	174	3.5
Wines and Liquors, in bbls.	38	6	White Lead—dry	86	4.75
Dry Goods, Cotton, Wool, Etc.			Red Lead and Litharge Putty—dry	132	3.75
Hurlap—in bales	43	6	Miscellaneous.		
Cord Yarn, in bales,	33	8	Glass and Chinaware — in cases	40	8
Cotton — in bales, compressed	18	8	Hides and Leather — in bales	20	8
Cotton Bleached Goods — in cases	28	8	Paper — newspaper and strawboard	35	6
Cotton Flannel—in cases..	12	8	Paper—writing and calendared	60	6
Cotton Sheeting—in cases.	23	8	Rope—in coils	32	6
Cotton Yarn—in cases....	25	8			
Excelsior—compressed	19	8			
Hemp—Manilla, compressed	30	8			
Linon Goods—in cases....	30	8			
Wool—in bales, not compressed	13	8			

NOMENCLATURE OF DRAWINGS

We present in the following pages a collation of symbols for plan nomenclature, which we hope will be the means of bringing about a more uniform practice. In addition to the convenience, which will result from uniform practice to those compelled to examine, estimate from or execute plans from different offices; it will be found that the proficiency of draftsmen will not be so seriously affected on changing from office to office if practice becomes uniform.

General symbols presented have been collated from various sources. To assist memory those symbols have been selected which are suggestive in their make up.

GENERAL SYMBOLS

	In color system use	
	Earth	Black
	Cinders	Green
	Concrete	Brown
	Stone	Blue
	Brick	Red
	Structural tile.....	Brown
	Composition wall blocks.....	Blue
	Architectural terra cotta.....	Brown
	Plaster	Blue
	Structural iron.....	Green
	Sheet metal.....	Green
	Floor tile, tile and mosaics....	Brown
	Marble (in elevation).....	Blue
	Marble (in section).....	Blue
	Terrazo	Black
	Wood in section (soft wood) with grain. (hard wood)	Yellow
	Wood in section (soft wood) across grain. (hard wood)	Brown
	Cork	Brown
	Glass	Blue
	Rubble	Dressed ashlar
Rubble stone	Rock faced ashlar	
Dimension stone	Any stone dressed	
Ashlar stone	Not described small numeral refers to details and specifications	

For illustration all lines indicating water pipes have a periodic double indentation suggestive of a "w"; gas lines a periodic embryo "G", etc.

Lighting symbols are those adopted by the American Institute of Architects and the National Electrical Contractors' Association, except that 50 watts is taken as the standard for one light unit instead of 16 c. p.

Structural iron standard symbols; the Osborn systems are so generally understood and used that it hardly seems necessary to publish same. (See Cambria pocket book, 1906 edition, p. 309.)

	Column: Small numeral indicates No. of particular column
	Door: Small numeral indicates No. of particular door
	Window: Small numeral indicates No. of particular window
	Indicates designating No. of a room or space.
	Elevation of point; small numerals indicate elevation above zero point.

PIPING SYMBOLS

	In color system
	Cold water.....Blue
	Hot water.....Red
	Hot water return.....Red
	Filtered or drinking water.....Blue
	Gas piping.....Green
	Air piping.....Green
	Compressed air piping.....Green
	Vacuum cleaning.....Green

SEWERAGE AND DRAINAGE

	Iron sewer pipe.....Green
	Sanitary iron sewer pipe.....Green
	Tile sewer.....Red
	Sanitary Tile Sewer.....Red
	Drainage tile.....Brown

	Soil pipe.....Green
	Waste pipe.....Green
	Down spout.....Green
	Vent riser.....Green
	Floor drain.....Brown
	Bracket: Prefix with "F" if for fuel.....Blue
	Ceiling: Prefix with "F" if for fuel.....Blue
	Floor outlet: Prefix with "F" if for fuel.....Blue
	Combined gas and electric, lower figure indicates No. of gas tips, upper figure. Indicates No. of 50 watt electric lamps.....Blue




STANDARD SYMBOLS FOR WIRING PLANS



	Ceiling Outlet
	Ceiling Outlet (Gas and Electric)
	Ceiling Lamp Receptacle Specification to Describe Type Such as Key, Keyless or Pull Chain
	Ceiling Outlet for Extensions
	Ceiling Fan Outlet
	Pull Switch
	Drop Cord
	Wall Bracket
	Wall Bracket (Gas and Electric)
	Wall Outlet for Extensions
	Wall Fan Outlet
	Wall Lamp Receptacle Specification to Describe Type Such as Key, Keyless or Pull Chain
	Single Convenience Outlet
	Double Convenience Outlet
	Junction Box
	Special Purpose Outlet Lighting, Heating and Power as Described in Specification
	Special Purpose Outlet Lighting, Heating and Power as Described in Specification
	Special Purpose Outlet Lighting, Heating and Power as Described in Specification
	Exit Light
	Floor Outlet
	Floor Elbow
	Floor Tee
	Local Switch (Single Pole)
	Local Switch (Double Pole)
	Local Switch (3 Way)
	Local Switch (4 Way)
	Automatic Door Switch
	Key Push Button Switch
	Electrolux Switch
	Push Button Switch and Pilot











As recommended and adopted by The Association of Electragists, International, The American Institute of Architects, and the American Institute of Electrical Engineers and approved by The American Engineering Standards Committee on March 6, 1924.


	Remote Control Push Button Switch
	Push Button
	Buzzer
	Bell
	Annunciator
	Interior Telephone
	Public Telephone
	Clock (Secondary)
	Clock (Master)
	Time Stamp
	Electric Door Opener
	Local Fire Alarm Gong
	City Fire Alarm Station
	Local Fire Alarm Station
	Fire Alarm Central Station
	Speaking Tube
	Nurse's Signal Plug
	Maid's Plug
	Horn Outlet
	District Messenger Call
	Watchman Station
	Watchman Central Station Detector
	Public Telephone (P.B.X.) Switchboard
	Interconnection Telephone Central Switchboard
	Interconnection Cabinet


	Telephone Cabinet
	Telegraph Cabinet
	Special Outlet for Signal System As described in specification
	Battery
	Tank Switch
	Motor
	Motor Controller
	Lighting Panel
	Power Panel
	Heating Panel
	Pull Box
	Cable Supporting Box
	Meter
	Transformer
	Branch Circuit, Run Concealed Under Floor Above
	Branch Circuit, Run Exposed
	Branch Circuit, Run Concealed Under Floor
	Signal Wires in Conduit Concealed Under Floor
	Signal Wires in Conduit Concealed Under Floor Above
	Tap Circuits Indicated by 2 Number 14 Conductors in 1/2" Conduit
	3 Number 14 Conductors in 1/2" Conduit
	4 Number 14 Conductors in 3/4" Conduit Unless Marked 1/2"
	5 Number 14 Conductors in 1" Conduit
	6 Number 14 Conductors in 1" Conduit Unless Marked 3/4"
	7 Number 14 Conductors in 1" Conduit
	8 Number 14 Conductors in 1" Conduit
	Feeder Run Concealed Under Floor Above
	Feeder Run Exposed
	Feeder Run Concealed Under Floor
	Pole Line


 Steam main—Arrow indicates direction of flow
 Return steam main—Arrow indicates direction of flow
 Temperature control piping


 S. F. 7 Steam feed vertical—No. designates particular pipe
 S. R. 5 Steam return vertical—No. designates particular pipe


 Flange cross
 Screw cross
 Flange Union
 Valve
 Gate valve
 Check valve
 Pneumatic valve
 Globe valve
 Reducing valve
 Temp. control thermostat.

 Radiator, wall supported numeral for identification

 Radiator, floor supported numeral for identification


 Pipe coil radiator


 Small numeral in inches gives size, and arrow locates feed


 Small numeral in inches gives size and arrow locates return


VENTILATING SYMBOLS


 Indicates direction of flow

 Indicates direction of foul air

 Indicates direction of hot air

 Enclosed numeral indicates particular register, inches indicate size

 Small numerals indicate No. of leader, inches indicate interior diameter, Arrow indicates flow

 Small numeral indicates No. of particular stack, inches indicate size

MECHANICAL EQUIPMENT



Pulley drive
Horizontal discharge



CENTRIFUGAL FAN



Motor drive



DISC FAN



PROPELLER FAN



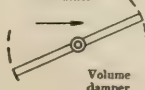
WASHER
Air washer



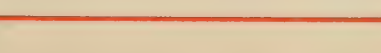
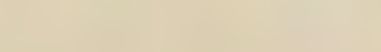
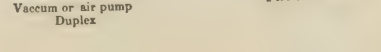
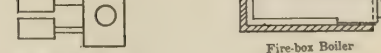
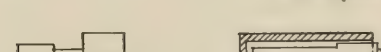
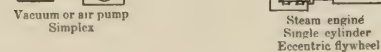
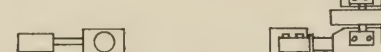
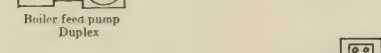
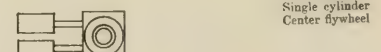
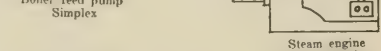
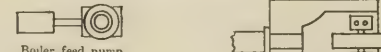
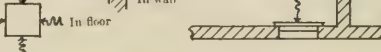
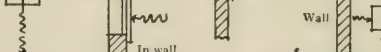
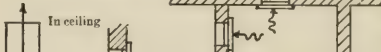
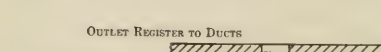
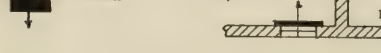
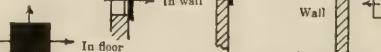
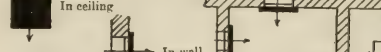
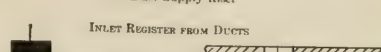
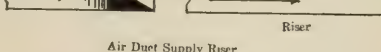
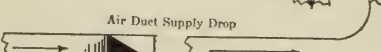
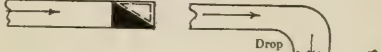
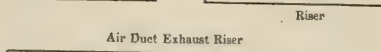
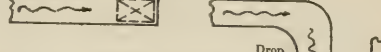
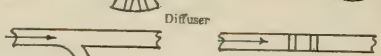
Positive blower



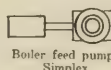
Electric motor



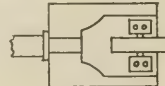
Volume damper



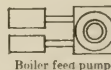
MECHANICAL EQUIPMENT



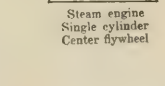
Boiler feed pump
Simplex



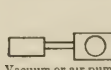
Steam engine
Single cylinder
Center flywheel



Boiler feed pump
Duplex



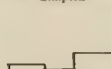
Steam engine
Single cylinder
Eccentric flywheel



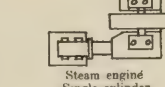
Vacuum or air pump
Simplex



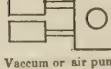
Fire-box boiler



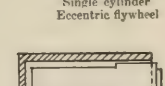
Vacuum or air pump
Duplex



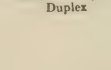
Fire-box boiler



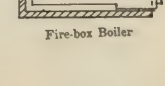
Vacuum or air pump
Duplex



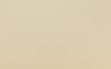
Fire-box boiler



Vacuum or air pump
Duplex



Fire-box boiler



Vacuum or air pump
Duplex



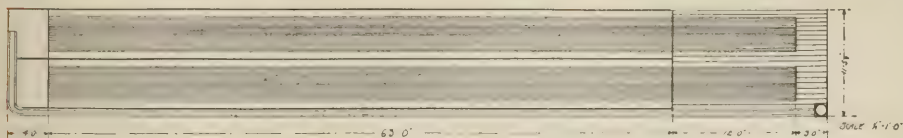
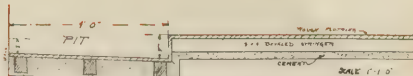
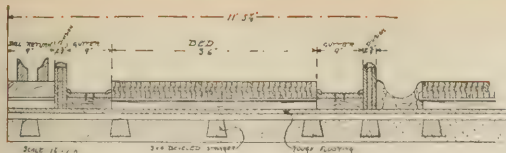
Fire-box boiler

TABLE OF TREADS AND RISERS.

[illegible]

RULE FOR CALCULATING PROPORTIONED WIDTH AND HEIGHT OF TREADS AND RISERS OF STAIRS.

Subtract the width of tread from 25 in. and the result will be twice the height of the riser. Thus: if the tread is 10 in. wide, then the height of riser proportionate to a 10-inch tread. This is exclusive of nosings.



SPACE OCCUPIED BY AUTOMOBILES.

Touring Cars.

Length, 13 ft. 6 in. to 20 ft.

Height, 7 ft. 3 in.

Width, 6 ft. 0 in.

Smallest practical door, 8 ft. 0 in. high by 8 ft. 0 in. wide. Alley door should be not less than 11 ft. 4 in. and should be set not less than 22 ft. from opposite side.

Heavy Trucks.

Length, 15 ft. to 26 ft.

Width, 6 ft. 0 in.

Height, 10 ft. 0 in.

Width on floor between wheel pockets, 48 in. Length of wheel pocket, 34 in.

Smallest practical door, 9 ft. 0 in. wide by 11 ft. 0 in. high; for largest trucks, 13 ft. 6 in. high.

Doors to alley should not be less than 12 ft. wide and should be set not less than 28 ft. from opposite side of alley.

Moving Vans.

Length, 13 ft. to 16 ft. 6 in.

Width, 7 ft. to 8 ft. 2 in.

Height, 10 ft. to 12 ft.

Smallest practical door 10 ft. 0 in. wide by 13 ft. 6 in. high.

CLEARANCE UNDER OLD ELEVATED RAILWAY STRUCTURES AND TROLLEY WIRES, 12 FT. 0 IN.

Clearance required by the city for steam roads, 13 ft. 6 in.

Architects will be perfectly safe in making the maximum limit of door heights for any sort of vehicle 13 ft. 6 in., standard subway height, as no vehicle can be used commercially on the streets of Chicago that will not clear steam road viaducts. They might go around elevated viaducts, but they can not go around steam road viaducts and there is a probability that any future elevated viaducts would be raised to the city standard height of 13 ft. 6 in.

FURNITURE DIMENSIONS.

FILE 8279

Chairs—Height of seat, 18"; depth of seat, 19"; top of back, 38"; arms, 9" above seat.

Lounge—6' long, 30" wide.

Tables—Writing, height, 2'-5"; sideboards, height, 3'-0"; general height, 2'-6".

Note—The smallest size practical for knee holes, 2' high by 1'-8" wide.

Beds—Single, width, 3' to 4'; 3/4 bed, width, 4'; double bed, width, 4'-6" to 5'-0", length 6'-6" to 6'-8"; standard double bed, 4'-6" x 6'-6"; footboards, 2'-6" to 3'-6" high; headboards, 5' to 6'-6".

Bureaus—Common, width, 3'-5" or 4'; depth, 1'-6" or 1'-8"; height, 2'-6" or 3'.

Commodores—Top, 1'-6" square and 2'-6" high.

Chiffoniers—3' wide, 1'-8" deep, 4'-4" high.

Cheval Glasses—Height, 6'-4" or 5'-0" or 5'-2"; width, 3'-2" or 2'-6" or 1'-8".

Washstands—Length, 3'-0"; width, 1'-6"; height, 2'-7".

Wardrobes—Length, 4'-6"—3'-0"; depth, 2'-0"—1'-5"; height, 8'-0".

Sideboards—Length, 5' to 6'; depth, 2'-2".

Pianos—Upright, length, 4'-10" to 5'-6"; height, 4'-4" to 4'-9"; depth, 2'-4". Square, length, 6'-8"; depth, 3'-4".

Billiard Tables—4'-8", 4 1/2" x 9, 5' x 10. Must have 16' x 20' space.

Wardrobe Shelves—5'-10" high.

Coat Hooks—5'-6" high.

Flour Barrel—28" to 30" high and 20" to 21" dia.

DATA ON BUILDINGS WITH SIDINGS.

Clearance from face of building to center of track, 7'-0".

Height of loading decks:

For shipping, 4'-0".

For receiving, 3'-0".

Clearance from center of track to edges of loading decks:

Upper edge, 7'-0".

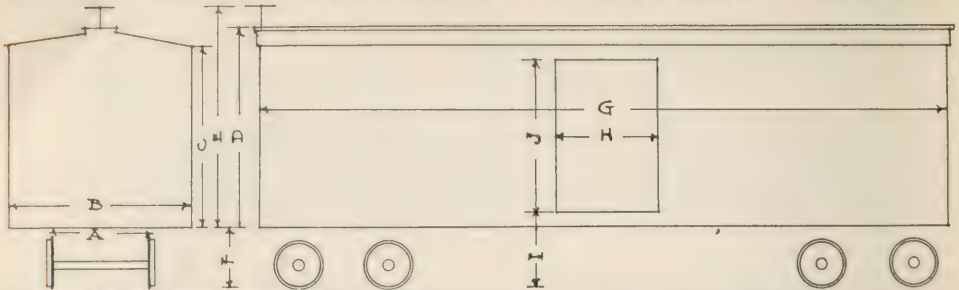
Lower edge, 5'-0".

Spec. No.	No. of Stops.	From Back to Front Line of Case.	Width of Space Required.	Height Required for Swell-Box and Large Pipes.
5	10	7' 4"	11' 6"	12' 6"
7	11	8'	11' 6"	12' 6"
8	12	8'	12' 6"	12' 6"
10	13	8' 7"	12' 6"	12' 6"
11	14	9' 3"	12' 6"	12' 6"
13	16	10' 5"	12' 6"	12' 6"
14	17	11'	14' 8"	17'
16	18	11' 7"	14' 8"	17'
17	19	12' 2"	14' 8"	17'
19	20	12' 9"	14' 8"	17'

Spec. No.	No. of Stops.	From Back to Front Line of Case.	Width of Space Required.	Height Required for Swell-Box and Large Pipes.
20	21	12' 9"	15' 6"	17'
22	22	13' 4"	15' 6"	17'
23	23	13' 6"	15' 6"	17'
25	24	14'	15' 6"	17'
26	25	14' 6"	15' 6"	17'
28	26	14' 6"	15' 6"	17'
29	27	14' 6"	16' 4"	17' 6"
31	28	15'	16' 4"	17' 6"
32	29	15' 6"	16' 4"	17' 6"
34	30	15' 6"	17'	17' 6"

Add 40" more from Front Line of Case for Keydesk Pedals and Seat.

SIZES OF FREIGHT CARS AND LEGAL RAILWAY CLEARANCES



Car.	A	B	C	D	E	F	G	H	I	J
North-Western	59"	9'-0"	9'- 4"	10'- 4"	10'-10"	33"	34'- 0"	60"	49"	7'-6"
Chicago & Alton.....	"	9'-3"	9'- 0"	10'- 6"	11'- 0"	36"	40'- 6"	72"	48"	7'-8"
New York Central.....	"	9'-3"	9'- 2"	10'- 2"	10'-10"	42"	36'- 6"	72"	48"	8'-0"
Baltimore & Ohio.....	"	9'-4"	8'-10"	9'-10"	10'- 6"	37"	36'- 6"	72"	42"	7'-7"
Pacific Fruit Express.....	"	9'-3"	9'- 0"	9'-10"	10'- 3"	40"	33'- 9"	48"	50"	6'-2"
North-Western Furniture..	"	9'-6"	10'- 6"	11'- 6"	12'- 0"	30"	50'- 6"	144"	40"	9'-8"
Cotton Belt.....	"	9'-3"	9'- 6"	10'- 6"	11'- 6"	33"	36'- 6"	62"	48"	7'-8"
Chicago & Alton.....	"	9'-2"	8'- 8"	9'- 8"	10'-11"	37"	34'- 8"	66"	47"	6'-8"
North-Western	"	9'-4"	9'- 2"	10'- 2"	11'- 2"	33"	36'- 6"	60"	49"	7'-6"
North-Western	"	9'-3"	8'- 5"	9'- 6"	10'- 7"	36"	34'- 6"	60"	46"	6'-10"
Erie	"	9'-6"	8'- 8"	9'- 8"	10'-10"	40"	34'-10"	62"	50"	6'-10"

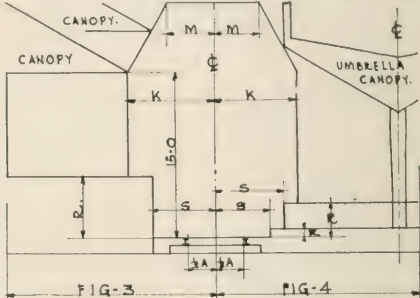
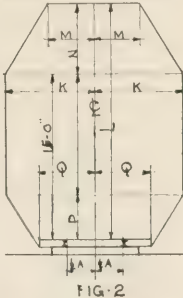


Fig. 1. Buildings and Miscellaneous Structures adjacent to Main Tracks, L=21' 6", K=8' 0"; Adjacent to Subsidiary Passenger Tracks L=21' 6", K=7' 6"; Tracks entering buildings L=car clearance (see diagram above for estimate), K=7' 0".

Structures adjacent to Subsidiary Freight Tracks except as otherwise specified. Tracks outside buildings L=21' 6", K=8' 0"; Tracks entering buildings L=practical car clearance, K=7' 0".

Fig. 2. Bridges supporting Main Tracks or Subsidiary Freight Tracks clearance shall be

as follows: L=21' 3", M=4' 2", 0", P=4' 0", Q=5' 0". Bridges spanning Main Tracks or Subsidiary Freight Tracks Fig. 1. L=21' 6", K=8' 0".

Fig. 3. High Freight Platforms R=not to exceed 5' 8", S=not less than 5' 8" except when such platforms have S=not less than 8' 0".

Fig. 4. High Passenger Platforms on exclusive passenger tracks may have R=height of car floor above rail. Low passenger platforms R=0' 8", S= not less than 5' 0".

Size of Swimming Tank.

Swimming tanks that can be used for swimming contests must be exactly 20 yards in interior length, no less. (A tank 1/2 inch short would be ruled out of contest.) Eight yards wide is best, although 7 yards will pass; 4 feet deep at shallowest point and 8 feet deep at deepest point, which deepest point should be about 12 feet from end where springboard is placed. Depth at springboard

end should be six feet. Interior of tank, both sides and bottom, should be white, and there should be three black lines on the bottom extending parallel with sides, and dividing the tank into four equal alleys; there should be a line across tank on bottom and up sides at exactly 2 yards from each end, measured horizontally, making lines exactly 16 yards apart horizontally.

Size of the Billiard Room and Bowling Alleys.

Table	Outside dimensions	Room space required
1 ...2½'x 5'	2' 9" x 4' 10"	10' x12'
2 ...3' x 6'	3' 4" x 5' 11¼"	11' x14'
3 ...3½' x 7'	3' 11" x 7' 1"	12' x15'
4 ...4' x 8'	4' 7" x 8' 5"	14' 2"x18'
5 ...4½' x 9'	4' 11¼"x 9' 1½"	14' 6"x18' 9"
6 ...5' x10'	5' 5½"x10' 1½"	15' x20'
7 ...6' x12'	6' 8" x12' 6"	16' x22'

1 is essentially a children's table, 2 and 3 sizes are provided to meet restricted space conditions, all sizes are adaptable to home use, sizes 4, 5 and 6 especially, 5 and 6 are the dominant commercial or club sizes, 7 English style standard cue length 57".

For dimensions required to use two or more tables of any size or sizes furnished, see manufacturer. For a single pair of 2 Regulation bowling alleys.

The length from back wall to the front of the approach, should never be less than 82 ft. This allows for pit and swinging cushion 4 ft. for alleys (to foul line) 63 ft. and for approach 15 ft. Width is 11'x5¼" but can be reduced if necessary. Space for players' seats for spectators should be in addition to the lengths and widths given. All drawings show concrete foundation construction which is necessary for basement installation, first floors where there is no basement.

MASONRY, PLASTERING AND FIREPROOFING.

Weight of Brickwork

Placing the weight of brickwork at 112 lb. per cubic foot, the weights per superficial foot for different walls are:

9 inch wall.....	84 lb.
13 inch wall.....	121 lb.
18 inch wall.....	168 lb.
22 inch wall.....	205 lb.
26 inch wall.....	243 lb.

Measurement of Old Brick

Uncleaned rough from building dumped from 8 to 10 bricks per cubic foot, or average of 111 cubic feet to the M.

Uncleaned stacked on outside and interior of stack filled promiscuously 10-12 per cubic foot, or average of 91 cubic feet to the M.

Cleaned and closely stacked, 16 to 18 bricks per cubic foot, or actual average of 59 cubic feet to M. (Usually sold at 60 cubic feet to M to allow for waste and poor piling.)

Cleaned stacked on outside and interior filled promiscuously, 12 to 14 per cubic foot, or actual average of 77 cubic feet to M. (When sold from pile measure customary to count 80 cubic feet to M, to allow for waste and bats.)

Measurement of New Brickwork

The Chicago Masons and Builders' Association have arbitrarily assumed that a cubic foot of wall contains 22½ common brick, or 7½ brick to the superficial foot of 4-inch wall and 15 brick to the superficial foot of 8-inch wall. These figures of the Masons' and Builders' Association are frequently used for the appraisal of party walls, etc., but if so used, the price per M for work in wall should be reduced accordingly.

The actual number of Chicago common brick required for a cubic foot of solid wall varies from 17½ to 19½, and masons in purchasing brick usually reserve 18 brick per cubic foot of solid wall; and when so doing, rarely find an excess or shortage at the end of construction. When the walls are divided into many small piers, requiring much cutting, and consequently much waste, it is best to figure 20 brick to the cubic foot.

On account of the wide variance of practice on the part of masons in estimating, architects, when calling for estimates on brick work by the thousand, will avoid useless controversy by stipulating that quantity of brick will be determined by superficial wall measurement according to the following rule, which is very nearly correct, as Chicago brick now run. Divide the total number of superficial feet of wall surface of a given thickness by 160, and multiply the result by the number of brick widths the wall is thick, and the result will equal the number of thousands of brick contained. A four-inch wall will contain 6¼ brick to the superficial foot, or 1,000 brick to 160 square feet.

Miscellaneous Masonry Data

One hundred yards of plastering will require fourteen hundred laths, four and a half bushels of lime, four-fifths of a load of sand, nine pounds of hair and five pounds of nails, for two-coat work.

A load of mortar measures a cubic yard, requires a cubic yard of sand and nine bushels of lime, and will fill thirty hods.

A bricklayer's hod measuring one foot four inches by nine inches, equals 1,296 cubic inches in capacity, and contains twenty bricks.

A single load of sand or other materials equals a cubic yard.

Cement Mortars

Recent developments in building codes and construction practice have shown a marked tendency toward the more extended use of portland cement mortars.

Where greatest strength is required cement and sand mortar is almost invariably recom-

mended; for a mortar with easy working and good weathering qualities, and with sufficient strength for all ordinary purposes, equal parts of cement and lime, with six parts of sand, is the formula generally adopted. The following paragraphs suggest good practice in specifying various types of mortar:

Mortar

Portland cement mortar used in laying up masonry shall be mixed in the proportion of one part of portland cement to not more than three parts of sand, measured by volume. Hydrated lime or lime putty may be added to an amount not exceeding 15 per cent, by volume, of the portland cement used.

Cement-and-lime mortar shall be mixed in the proportion of one part of portland cement and one part of lime to not more than 6 parts of sand, all by volume.

Lime or natural cement mortar shall be mixed in the proportion of one part of lime or cement to not more than 3 parts of sand measured by volume.

Whenever cement-and-lime mortar or natural cement mortar is used instead of portland cement mortar, the allowable working stresses on the masonry shall be reduced to 50 per cent of that allowed with portland cement mortar.

Whenever lime mortar is used instead of portland cement mortar, the maximum allowable working stress shall be reduced to 50 per cent of that specified for masonry laid up with portland cement mortar.

Where masonry is to be highly stressed, mortar is often tested. The following table shows what the strength of the various types of mortar should be, where tests are deemed advisable:

Strengths of Mortars Under Typical Field Condition*

Aggregates, by volume	Compressive Strength at 28 days. Average of five 2-inch cubes or cylinders stored in air.	
	Water Percent ¹	Lbs. per sq. in.
1:3 Portland cement and sand	22	500
1:1:6 Portland cement, hydrated lime and sand.....	25	200
1:1:4 Portland cement, hydrated lime and sand.....	25	300
1:3 Hydrated lime and sand.....	30	30

*See page 30, "Recommended Minimum Requirements for Masonry Wall Construction," Report of Building Code Committee, U. S. Department of Commerce.

¹Percentages in terms of total weight of dry materials. The water proportions given are those ordinarily used for mortar for laying brick; not those necessarily resulting in the greatest mortar strength.

The cleanliness of the sand used has an important effect upon the strength of mortar or concrete. Excessive amounts of silt, clay, loam or organic matter are harmful. The influence of these impurities is somewhat irregular and therefore clean sand should be insisted upon. Care should also be taken not to permit the use of sand which has become mixed with soil at the bottom of storage piles.

The following data will assist in estimating the quantities of material needed for brick work when portland cement mortar is used: Ordinarily approximately 13.8 cu. ft. of mortar is required to lay 1,000 brick. 2.4 barrels of cement and 1.06 cu. yds. of sand are required to produce 1 cu. yd. of cement mortar. It is customary to assume that one bag of portland cement equals 1 cu. ft. and that a bag of hydrated lime equals about 1¼ cu. ft. In proportioning mortar, if the sand is thoroughly dry, a small reduction in the standard amount of sand used is desirable.

OVERLAYING CONSTRUCTION SHEET, SHINGLE AND COMPOSITION COVERING.

FILE 685.1

The average width of a shingle is four inches. Hence, when shingles are laid four inches to the weather each shingle averages 16 square inches, and 900 are required for a square of roofing (100 square feet). If $4\frac{1}{2}$ inches to the weather, 800; 5 inches, 720; $5\frac{1}{2}$ inches, 655; 6 inches, 600.

Slating.

FILE 685.2

Slating is estimated by the "square," which is the quantity required to cover 100 square feet. The slates are usually laid so that the third laps the first three inches.

Number of Slates per Square.

Size in Inches.	Pieces per Square.	Size in Inches.	Pieces per Square.	Size in Inches.	Pieces per Square.
6 × 12	533	8 × 16	277	12 × 20	141
7 × 12	457	9 × 16	246	14 × 20	121
8 × 12	400	10 × 16	221	11 × 20	137
9 × 12	355	9 × 18	213	12 × 22	126
7 × 14	374	10 × 18	192	14 × 22	108
8 × 14	327	12 × 18	160	12 × 24	114
9 × 14	291	10 × 20	169	14 × 24	98
10 × 14	261	11 × 20	154	16 × 24	86

The weight of slate per cubic foot is about 174 pounds, or per square foot of various thicknesses as follows:

Thickness in inches.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$
Weight in pounds.....	1.81	2.71	3.62	5.43	7.25

The weight per square foot of roof tiling, set in iron or between wood rafters ready for slating, is about 12 pounds.

Tin Roofs.

Tin roofs should be laid with cleats.

There are two kinds of tin—"bright tin," the coating of which is all tin, that is, the tin proper; and "tern," "leaded," or "roofing" tin, the coating of which is a composition, part tin and part lead. This last will not rust any quicker, but the sulphur in soft coal smoke eats through the "leaded" coating sooner than through the "tinned."

Sizes of tin, 10 by 14 and 14 by 20, and two grades of thickness—IC light, and IX, heavy. For a steep roof (one-sixth pitch or over) the IC 14 by 20 tin ("leaded" if high up where little smoke will get to it; "bright" if low down), put on with a standing groove, and with the cross seams put together with a double lock, makes as good a roof as can be made. For flat roofs IX 10 x 14 "light" is best, laid with cleats, but the others make good roofs and any of them will last twenty-five years at least, if painted periodically.

Number of Square Feet a Box of Roofing Tin Will Cover.—For flat seam roofing, using $\frac{1}{2}$ -inch locks, a box of "14 by 20" size will cover about 192 square feet, and for standing seam, using $\frac{3}{4}$ -inch locks and turning $1\frac{1}{4}$ and $1\frac{1}{2}$ inch edges, making 1-inch standing seams, it will lay about 168 square feet.

For flat seam roofing, using $\frac{1}{2}$ -inch locks, a box of "28 by 20" size will cover about 399 square feet, and for standing seam, using $\frac{3}{4}$ -inch locks and turning $1\frac{1}{4}$ and $1\frac{1}{2}$ inch edges, making 1-inch standing seams, it will lay about 365 square feet.

Every box of roofing plates (IC or IX "14 by 20" or "28 by 20" sizes) contains 112 sheets.

For roofs and gutters use seven-pound lead; for hips and ridges, six-pound; for flashings, four-pound.

Gutters should have a fall of at least one inch in ten feet.

No sheet lead should be laid in greater length than ten or twelve feet without a dip to allow for expansion.

Joints to lead pipes require a pound of solder for every inch in diameter.

SANITARY EQUIPMENT

INCLUDING PLUMBING AND HEATING

Capacity of Cisterns.

FILE 697.3

For a circular cistern, square the diameter and multiply by .7854, for the area; multiply this by 1,728 and divide by 231, for number of gallons of one foot in depth; for a square cistern, multiply length by breadth, and proceed as above.

CIRCULAR CISTERN.

5 feet in diameter holds	4.66 bbls.
6 feet in diameter holds	6.71 bbls.
7 feet in diameter holds	9.13 bbls.
8 feet in diameter holds	11.93 bbls.
9 feet in diameter holds	15.10 bbls.
10 feet in diameter holds	18.65 bbls.

SQUARE CISTERN.

5 feet by 5 feet holds	5.92 bbls.
6 feet by 6 feet holds	8.54 bbls.
7 feet by 7 feet holds	11.63 bbls.
8 feet by 8 feet holds	15.19 bbls.
9 feet by 9 feet holds	19.39 bbls.
10 feet by 10 feet holds	23.74 bbls.

Wrought-iron Welded Pipe.

DIMENSIONS, WEIGHTS, ETC., OF STANDARD SIZES FOR STEAM, GAS, WATER, OIL, ETC.

Inside Diameter	Outside Diameter	External Circumference, A	Length of Pipe per Sq Foot of Outside Surface.	Internal Area	External Area	Length of Pipe containing one Cubic Foot.	Weight per Foot of Length	No. of Threads per Inch of Screw.	Contents in *Gallons per Foot.	Weight of Water per Foot of Length.
In.	In	In.	Ft.	In.	In	Ft	Lbs.			Lbs.
1/8	.40	1.272	9.44	.012	.129	2,500	.24	27	.0006	.005
1/4	.54	1.626	7.075	.049	.229	1,385	.42	18	.0026	.021
3/8	.67	2.121	5.657	.110	.358	751.5	.56	14	.0057	.047
1/2	.84	2.652	4.502	.196	.554	472.4	.84	14	.0102	.085
3/4	1.05	3.299	3.637	.441	.866	270.	1.12	11 1/2	.0230	.190
1	1.31	4.134	2.993	.785	1.357	166.9	1.67	11 1/2	.0408	.349
1 1/4	1.66	5.215	2.301	1.227	2.164	96.25	2.25	11 1/2	.0638	.527
1 1/2	1.9	5.969	2.01	1.767	2.835	70.65	2.69	11 1/2	.0918	.760
2	2.37	7.401	1.611	3.141	4.330	42.36	3.66	8	.1632	1.356
2 1/2	2.87	9.032	1.328	4.908	6.491	30.11	5.77	8	.2550	2.116
3	3.5	10.996	1.091	7.068	9.621	19.49	7.54	8	.3673	3.049
3 1/2	4	12.566	.955	9.621	12.566	14.56	9.05	8	.4998	4.155
4	4.5	14.137	.849	12.566	15.904	11.31	10.72	8	.6528	5.405
4 1/2	5.	15.708	.765	15.904	19.635	9.03	12.49	8	.8263	6.851
5	5.56	17.475	.699	19.635	24.299	7.20	14.56	8	1.020	8.500
6	6.62	20.813	.577	25.274	34.471	4.98	18.56	8	1.469	12.312
7	7.62	23.954	.505	35.484	45.663	3.72	23.41	8	1.999	16.662
8	8.62	27.096	.444	50.265	58.426	2.88	28.34	8	2.611	21.750
9	9.68	30.433	.394	63.617	73.715	2.26	34.67	8	3.300	27.500
10	10.75	33.772	.355	78.540	90.792	1.80	40.64	8	4.081	34.000

* The Standard U. S. gallon of 231 inches.

Divide the external circumference column, A, by 12 and the result will be the square feet of surface per lineal foot.

Grade Per Mile.

The following table will show the grade per mile:

An inclination of

1 foot in 15 is	352 feet per mile.
1 foot in 20 is	264 feet per mile.
1 foot in 25 is	211 feet per mile.
1 foot in 30 is	176 feet per mile.
1 foot in 35 is	151 feet per mile.

1 foot in 40 is	132 feet per mile.
1 foot in 50 is	106 feet per mile.
1 foot in 100 is	53 feet per mile.
1 foot in 125 is	42 feet per mile.

To find quantity of water elevated in one minute running at 100 feet of piston speed per minute: Square the diameter of the water cylinder in inches and multiply by 4. Example: Capacity of a 5-inch cylinder is desired. The square of the diameter (5 inches) is 25, which, multiplied by 4, gives 100, the number of gallons per minute (approximately).

Quantity of Brickwork in Barrel Drains and Wells.

Diameter in Clear	Thickness of Brickwork	Superficial Feet of Brickwork in One Linear Yard.	Number of Bricks Required for One Linear Yard
1 foot, 0 inches	0 feet, 4½ inches	16 feet, 6 inches	115
1 " 6 "	0 " 4½ "	21 " 2 "	148
2 " 0 "	0 " 4½ "	25 " 10 "	181
2 " 0 "	0 " 9 "	33 " 0 "	462
2 " 6 "	0 " 9 "	37 " 8 "	528
2 " 6 "	1 " 1 "	43 " 2 "	906
3 " 0 "	0 " 9 "	42 " 6 "	594
3 " 0 "	1 " 1 "	47 " 10 "	1004
3 " 6 "	0 " 9 "	47 " 1 "	659
3 " 6 "	1 " 1 "	52 " 7 "	1104
4 " 0 "	0 " 9 "	51 " 10 "	725
4 " 0 "	1 " 1 "	57 " 3 "	1203
5 " 0 "	0 " 9 "	61 " 3 "	857
5 " 0 "	1 " 1 "	66 " 9 "	1402
6 " 0 "	1 " 1 "	76 " 1 "	1597
7 " 0 "	1 " 1 "	85 " 6 "	1795

Tests for Pure Water.

Color: Fill a clean long bottle of colorless glass with the water; look through it at some black object. It should look colorless and free from suspended matter. A muddy or turbid appearance indicates soluble organic matter or solid matter in suspension. **Odor:** Fill the bottle half full, cork it, and leave it in a warm place for a few hours. If when uncorked it has a smell the least repulsive, it should be rejected for domestic use. **Taste:** If water at any time, even after heating, has a disagreeable taste, it should be rejected.

A simple semi-chemical test is known as the "Heisch test." Fill a clean pint bottle three-fourths full of the water; add a half-teaspoonful of clean granulated or crushed loaf sugar; stop the bottle with glass or a clean cork and let it stand in a light and moderately warm room for forty-eight hours. If the water becomes cloudy, or milky, it is unfit for domestic use.

Capacity of Drain Pipe.

SIZE OF PIPE.	GALLONS PER MINUTE.							
	½-in. Fall per 100 ft.	3-in. Fall per 100 ft.	6-in. Fall per 100 ft.	9-in. Fall per 100 ft.	12-in. Fall per 100 ft.	18-in. Fall per 100 ft.	24-in. Fall per 100 ft.	36-in. Fall per 100 ft.
3-inch	21	30	42	52	60	74	85	104
4 "	36	52	76	92	108	132	148	184
6 "	84	120	169	206	240	294	338	414
9 "	232	330	470	570	660	810	930	1140
12 "	470	680	960	1160	1360	1670	1920	2350
15 "	830	1180	1680	2040	2370	2920	3340	4100
18 "	1300	1850	2630	3200	3740	4600	5270	6470
20 "	1760	2450	3450	4180	4860	5980	6850	8410

Table showing the velocity of discharge of different sized sewers.

Diam. of pipe.	180 feet per minute, 3 feet per second.		270 feet per minute, 4½ feet per second.		360 feet per minute, 6 feet per second.		540 feet per minute, 9 feet per second.	
	Fall.	Gallons per minute.	Fall.	Gallons per minute.	Fall.	Gallons per minute.	Fall.	Gallons per minute.
3.....	1 in 69	54	1 in 30.4	81	1 in 17.2	108	1 in 7.6	162
4.....	1 in 92	96	1 in 40.8	144	1 in 23.	192	1 in 10.2	288
6.....	1 in 138	216	1 in 61.2	324	1 in 34.5	432	1 in 15.3	648
9.....	1 in 207	495	1 in 92.	742.5	1 in 51.7	990	1 in 23	1,485

Transmission of Heat by Various Substances.

FILE 697.43

Window glass being.....	1,000
Oak or Walnut.....	66
White Pine.....	80
Pitch Pine.....	100
Lath and Plaster.....	.75 to 100

Brick (rough).....	200 to 250
Brick Whitewashed.....	200
Granite or Slate.....	250
Sheet Iron.....	1,030 to 1,110

Table Showing Amount of Glass Surface which may be Heated by 1 Square Foot of Radiating Surface in Good Buildings.

Temperature of radiating surface (radiators) Fahr.....	Hot Water.			Steam.	
	160°	180°	200°	227° 5 Lbs.	240° 10 Lbs.
Square Feet of Glass to 1 Square Foot Radiator Surface.					
Temperature above surrounding air 90°.....	1.9	2.3	2.8	3.3	3.8
" " " " 80°.....	2.3	2.9	3.5	4.0	4.6
" " " " 70°.....	3.0	3.6	4.2	5.0	5.7
" " " " 60°.....	4.0	4.6	5.25	6.0	7.0
" " " " 50°.....	5.0	6.0	6.8	8.0	9.0
" " " " 40°.....	6.9	8.0	8.2	10.0	11.5

Formulae for Figuring Radiation for Factories.

A formula for figuring radiation which is used by some of the best heating engineers in determining the amount of radiation for factory buildings is as follows: $\frac{G}{33} + \frac{W}{10.9} + \frac{V}{171} =$ sq. ft. of radiation in which, G = Glass Area.
W = Net Wall Area.
V = Volume of air in the Room.

SIZE OF STANDARD FLUE LINING ON SALE ON THIS MARKET.

Outside size.	Inside size.	Inside area.
4¼ x 8½ in.	3½ x 7¼ in.	22.6 sq. in.
8½ x 8½ in.	7 x 7 in.	49 sq. in.
13 x 13 in.	11½ x 11½ in.	135 sq. in.
4½ x 13 in.	3½ x 11½ in.	36.5 sq. in.
8½ x 13 in.	6½ x 11½ in.	77 sq. in.
13 x 18 in.	11½ x 16¾ in.	193 sq. in.
8½ x 18 in.	6½ x 16½ in.	114 sq. in.
13 x 18 in.	15¾ x 15¾ in.	247 sq. in.
21 x 21 in.	19½ x 19½ in.	
24 x 24 in.	21½ x 21½ in.	

GENERAL RULE FOR BRICK STACKS.

Diameter of base should not be less than 1/10 of height if square, or round, 1/12 of height. Batter of stacks 3/100 of an inch to the foot in height. Thickness of brick work should be not less than one brick from top to 25 feet below same, changing to 1½ brick from 25 feet to 50 feet below top, increasing

½ brick in thickness for each succeeding 25 feet, measuring from the top downward.

Fireplace Flue Areas.

For three-story building, area at top of smoke chamber should be 1/12 of area of fireplace opening.

Two-story building area at top of smoke chamber should be 1/10 of area of fireplace opening.

One-story building area at top of smoke chamber should be ¼ area of fireplace opening.

Throat of fireplace should never be less than 3 in. or more than 4½ in. by the width of fireplace opening.

Front edge of arch should never be thicker than one-half brick, approximately 4 in.

Splay of sides of flue from throat opening up to flue lining should be 2 in. to the foot. The raise from soffit or lintel, or from highest point or soffit to arch should be 6 in.

APPROXIMATIONS OF RADIATION

By Samuel R. Lewis.

The computations for figuring heaters depend on accurate data as to the conductivity of the building and on the temperatures on each side of the wall. The figures should be worked out for each case by a competent engineer.

Steam Radiators

For the average room in a fairly well built house which is to be heated continuously, an approximation of the amount of steam radiation may be obtained by dividing the square feet of glass surface by 2 and the square feet of outside wall, not deducting the glass, by 13; the sum of these two being the sq. ft. of direct cast iron steam heating surface.

Hot Water Radiators

If hot water at 140-180 degrees is to be used the approximate steam radiation would be multiplied by 1.66.

Boilers

The boiler for a steam or water heating system should be selected on the basis of its guaranteed efficiency when burning some specified fuel at a given rate of combustion. For rough approximations with small boilers, the rating of the boiler should be about double the actual radiation. This addition

allows for getting started, for possible unfortunate chimney, inefficient clinker removal, old leaking house, long periods between firing, etc.

One square foot of steam radiation requires from 600 lbs. to 800 lbs. of steam per heating season, or from 70 to 90 lbs. of bituminous coal per season, or about 1,200 cu. ft. of manufactured gas per season, or 4 gallons of average fuel oil per season.

One heat unit will warm .238 lbs. of air one degree at 70 degrees or about 55 cu. ft. of air.

One pound of ice in melting absorbs 144 heat units.

Hospitals and hotels use about 85 gallons of hot water per 24 hours per hot water fixture, plus 1 gallon per piece per day for laundries and plus 3 gallons per meal per person for kitchens.

The following is a fair average over the heating year of the percentages of fuel used during each month in Chicago:

Jan....21%	April...9%	Nov....13%
Feb....18%	May...4%	Dec....17%
March..14%	Oct....4%	Total..100%

PRELIMINARY ELEVATOR PROPORTIONING

During the preparation of preliminary studies for a building it is always necessary to decide on tentative elevator requirements for the different types of buildings required to be designed. The following table of capacities, speeds and type of control for the various classes of buildings represents good general practice, but must be varied to meet special conditions:

	Capacity in Lbs.	Recommended Speed for Floors as shown						Control
		3	4	7	8-12	13-20	21-30	
1. Department Store	2,500-4,000	100	200	300	400	500	Automatic Landing	
2. Single Line Store	1,500-2,500	100	300	400			Car Switch Voltage Control	
3. Lott Building	2,000-4,000	100	150	250			Car Switch	
4. Public Building	2,500-3,500	100	250	400	500		Car Switch with Automatic Landing	
5. Hospitals (passenger)	1,500-2,500	100	200	300	400		Dual (both Car Switch and Push Button)	
6. Hospitals (service)	1,500-2,500	60	100	150	300		Push Button Control	
7. Factory (freight)	4,000-12,000	60	100	150			Car Switch (with landing de vice if trucking service)	
8. Hotel (passenger)	2,000-3,000	100	300	600	600	700	Automatic Landing Device	
9. Hotel (service)	1,500-2,500	100	200	400	500	600	Car Switch	
10. Apartment Hotel (passenger)....	1,500-2,500	100	300	400	500	600	Car Switch Push Button or Dual	
11. Garage (auto lift).....	4,000-10,000	60	200	300	500	500	Car Switch Car Switch with Voltage Control	
12. Office Building (local service)...	2,000-3,000	100	300	400	600	700	Signal Control	
13. High Office Building.....	1,500-2,500	Local Run			Express Run			
		10 floors, 600 F.P.M.			10 floors, 600 F.P.M.			
					20 floors, 700 F.P.M.			
					30 floors, 800 F.P.M.			
					40 floors, 800 F.P.M.			
					50 floors, 900 F.P.M.			

Each building is a transportation problem in itself to be solved only when the height of building, area per floor, type of tenants, visiting public and peak traffic periods are fully considered. Tables and figures given here can be taken only as generalities. However, there are certain fundamental considerations and rule of thumb calculations that aid the architects materially in the early drafts of a building.

In general, 25,000 square feet of rental area per elevator will give average service. Tower sections of high buildings are exceptions due to the unproportionate distance of travel. A traffic engineer of a reliable elevator company should early be consulted for tower buildings.

All students of elevator traffic agree that for buildings of 18 stories or more where the elevators are divided into local and express banks, more cars of smaller capacity give quicker emptying time and shorter interval of departure than do fewer large cars. While precedence has established a near standard of 2,500-pound capacity, a study of the traffic problems will show that with cars of 2,000-pound capacity and possibly one additional car bank will improve the handling of the building's population because fewer passengers means fewer stops, and so quicker round trip time.

The A. S. M. E. prescribes 75 pounds per square foot of effective cab area in calculating the carrying capacity of passenger cars. This is based on 150 pounds per person and 2 square feet per person.

There are two major classifications of control as related to electrical energy supply, rheostatic and voltage control. Rheostatic control has the full voltage of the power company's supply brought to the elevator control board. Acceleration and deceleration are obtained by short circuiting portions of the current through resistance grids where the current is dissipated as heat. These steps vary from two to five depending on the running speed of the elevators and are controlled through contacts in the car operator's switch.

Voltage control embodies a constant speed motor generator set for each elevator hoisting motor. Just the amount of current needed to properly accelerate the car is fed to the elevator motor in much the same way a locomotive engineer gradually increases the steam throttle opening. Voltage control gives

infinitely smooth acceleration and deceleration and easy riding qualities which increases the life of equipment and permits economy of operation because no electricity is wasted through grid circuits.

The classifications of control as related to operation are: Push Button, Car Switch, and Signal Control.

Push button control is a general classification for automatic elevators. There are variations, such as Constant Pressure Push Button, Momentary Pressure Push Button, and Collective Control, any one of which may be using either rheostatic or voltage control power. Push button control finds its use in apartments or buildings where the elevators are rarely used. In either case the automatic feature is applied to dispense with an operator. It is inherent then, that proper application can be made only when every one who will use the elevator is familiar with its operation. Thus residential tenants, as in apartment buildings, may be schooled to manipulate the elevator, or the employees of a firm having elevators rarely used.

Car switch control requires the services of an operator to drive the car. This type of control is essential where there is a transitory traffic as in office and public buildings. Where large numbers of people must be handled for peak periods the push button control becomes inadequate and an operator with car switch control becomes a necessity.

Signal control is a combination of the better characteristics of both Push Button and Car Switch controls. It is the latest engineering accomplishment of the industry and embodies the automatic features of the Push Button elevator with its accurate landing at floor levels, but driven by an operator to supply that human element essential where masses are to be handled.

Merely high speed elevators do not mean fast service as seen by the following time analysis of an elevator cycle:

- Loading time at main floor.
- Time for closing doors and gates.
- Accelerating time.
- Running time at full speed.
- Decelerating time.
- Time for opening doors.
- Unloading and loading time at all stops.
- Time for closing doors and gates.

THE ORDERS AND THEIR APPLICATION

By ALFRED W. S. CROSS, M. A., F. R. I. B. A., and ALAN E. MUNBY, M. A.

Introduction.

So many scholarly works upon the Orders are in existence, that some explanation seems to be called for in introducing another series of articles upon a subject that is, to all appearances, already well worn.

Notwithstanding the consensus of opinion as to the general proportions that ought to be followed in their delineation, an opinion based upon the rules laid down by the architects of an early period of the Renaissance, a surprising divergence from the precepts and practices of these old masters of their art is to be found in many buildings of our own time.

The writers are only aware of the existence of one book which seems to meet the usual office requirements, and that is a work entitled: "Rules for Drawing the Several Parts of Architecture," by James Gibbs, published in 1732: a book that has never been reprinted and copies of which are not now readily obtainable. The object aimed at, and successfully attained, is an illustration and description of an example of each Order, not "after Gibbs," but representing one of a good average type of design so proportioned that the dimensions of the various parts bear simple and easily discernible ratios one to another.

An attempt has been made to co-ordinate the leading features of the book by re-drawing some of the illustrations, retaining the useful dimensions shown thereon and entirely re-writing the description of the plates, with the introduction of some general principles likely to be of value to the draughtsman and student, for which purpose the opinions of standard writers, particularly those of Sir William Chambers, have been freely incorporated.

Before attempting such a condensation of the material in the book it was thought desirable to ascertain how far the generalizations adopted by Gibbs really represent the proportions used by acknowledged authorities. For this purpose the average ratio of the diameter of the column to the height of the entablature, as being a relation which essentially affects the whole proportion of the Order, was obtained by measuring a number of recognized examples, and it may be of interest to give the results, as an indication of the actual value of the dimensions used.

The result renders it evident that the general proportions of the Orders as recommended for adoption by this architect are fully worthy of confidence.

Hence, it would obviously seem preferable to master a few main dimensions, and, having thus inculcated a general sense of proportion, to rely upon gaining familiarity with the plates by constant use, when the proportions of the smaller members of the compositions will become naturally assimilated. The Composite Order is given in Gibbs' book, but, owing to its similarity to the Corinthian and to the absence of a consensus of opinion as to its dimensions, it has not been included in the present work.

No encroachments have been shown on any of the Orders to avoid distracting attention from the dimensions. With the exception of the whole of the Tuscan Order and of the frieze of the Ionic Order there are few members, apart from mere fillets, which have not been enriched, by some form of ornament, in one or another example, the Doric naturally the least and the Corinthian the most. In the latter Order, in fact, even the cyma and corona of the cornice, in addition to the frieze, ogees and beads, are often ornamented, but, apart from the question of expense, it is undesirable to carry such elaboration too far, as when placed in close contact with each other, especially when a distant view is alone possible, one moulding will often rob another of its effect, and, indeed, the value of richness of detail is more often than not lost in this manner.

The enrichment of columns beyond ordinary flutings is generally to be deprecated, while the application of ornament to bases and pedestals is seldom either requisite or desirable.

However great may be the utility of drawings dealing with the Orders, it should never be forgotten that they are merely a means to an end, that end being an executed building. Those whose work is confined to a drawing board develop a strong tendency to consider their compositions solely from an elevational and artistic draughtsman's point of view, and every opportunity should be taken of checking this habit and of cultivating the art of thinking "in the round." The study of per-

TABLE SHOWING THE APPROXIMATE RATIO BETWEEN THE LOWER DIAMETER OF THE COLUMN AND THE HEIGHT OF THE ENTABLATURE.

Tuscan.	Doric.	Ionic.	Corinthian.
Alberti .....1:1.5	Alberti .....1:2.0	Alberti.....(1:1.4)	Alberti .....1:1.8
Palladio .....1:1.8	Palladio .....1:1.9	(1:1.7)	Palladio .....1:2.0
Scamozzi .....1:1.9	Scamozzi .....1:2.1	Palladio .....1:2.0	Scamozzi .....2:2.0
Vignola .....1:1.8	Vignola .....1:2.0	Scamozzi .....1:1.8	Vignola .....1:2.5
—	Parthenon .....1:2.0	Vignola .....1:2.3	Pantheon .....1:2.3
—	Baths, Diocletian 1:2.0	Fortuna (Rome) 1:2.3	Jupiter Stator 1:2.5
—	Temple Pestum .1:1.7	Baths, Diocletian 1:1.9	Jupiter Tonans. 1:2.2
St. Paul's Convent	Apollo, Delos .1:1.8	Minerva, Athens. 1:2.3	Temple Antonius 1:2.3
Garden ...1:1.8	Eow Church,	Illius, Athens...1:2.3	
	Portico .....1:1.9	Banqueting Hall.1:2.0	Hambden Court..1:2.2
Average .....1:1.76	Average .....1:1.93	Average .....1:2.00	Average .....1:2.00
Gibbs .....1:1.75	Gibbs .....1:2.00	Gibbs .....1:1.82	Gibbs .....1:2.00

The above examples have not been selected with any intention of justifying the proportions adopted by Gibbs, but are merely cited as those which readily occurred to the mind, or of which the dimensions could be easily obtained.

spective of buildings, and, best of all, the preparation of models of portions of a proposed building, an occupation which often results in the discovery of latent defects of design, are alike of the greatest educational value to the student of architecture.

THE SETTING UP OF AN ORDER.

(To be studied in connection with Plates I, II., III., IV. and V.)

The sequence followed in setting up an Order will be found to influence, to some extent, the rapidity and facility with which it can be accomplished. An outline of the method of procedure may, therefore, prove useful.

Usually the height of the Order is fixed by circumstances, as, for example, when it is to be applied to a given story of a building.

The total height having been settled, draw the limiting horizontal lines and then set out the vertical centre lines of the columns, thus dividing the frontage to be treated into bays appropriate to the exigencies of the design and having due regard to the correct intercolumniation of the Order adopted. If a pedestal is to be placed under the column, cut off one-fifth of the total height for it, and cut off one-fifth or one-sixth of the remainder (measured from the top limiting horizontal line) for the vertical height of the entablature; the intervening space gives the height of the column, including its cap and base. If no pedestal is to be used, divide the whole of the given height into five or six parts, cut off one of these parts, from the top, for the entablature, and the remainder gives the height of the column.

The Column. Since some of the dimensions of the entablature are in terms of the diameter of the column, the latter should be next developed. The term "diameter of the column" refers always to its greatest diameter—namely, that of the shaft just above the lower cincture. This dimension is one-seventh to one-tenth of the height between the soffit of the entablature and the top of the pedestal, or lower limit of the Order in the absence of a pedestal. If the centre lines of the piers do not represent the centres of the columns, as, for instance, when coupled columns are used, the centre line of one of the columns must now be decided upon and the diameter of the Order symmetrically disposed horizontally across it. A semi-diameter is then cut off, from the bottom of the column, for the height of the base, and it should be noticed that this—except in the Tuscan and alternative Doric Orders—does not include the fillet at the base of the shaft, the members above the upper torus being reckoned as part of the shaft, as are also the astragal and fillet below the necking of the capital of the column. The plinth and lower torus of the base project one-third and the upper torus one-fifth of a semi-diameter beyond the lower circumference of the shaft. The leading lines for the base having thus been obtained, cut off by a horizontal line the height of the capital from the top of the column, and (except in the Ionic Order) again below it, a height equal to one-sixth of a semi-diameter for the astragal and fillet below the necking.

The semi-diameter of the shaft at one-third of its height from the bottom is then divided into five or six parts, and four or five of these parts are taken as a semi-diameter at the top, below the astragal. The shaft may now be completed, the entasis being usually made to start from the greater diameter, one-third up the shaft, below which point it is a true cylinder until the cincture at the base is reached. This is the best method to adopt in the case of small scale drawings. Where large detailed drawings are in question the diameter may be alternatively divided at the base of the shaft instead of at one-third of

the height, and the entasis extended throughout the whole length. The completion of the shaft enables the projection of the capital to be marked off, and also that of the astragal and fillet, which is equal to their combined height.

The Entablature. The development of the entablature can now be proceeded with, the architrave, frieze and cornice being ruled off horizontally and the members of each inserted (see dimensions). The projections for a returned end or section are obtained from the upper diameter of the shaft. The lowest member of the architrave, and also the frieze, lie vertically over the circumference of this upper end of the shaft. The projection of the cornice beyond the frieze line is equal to its height, except in the Doric Order, in which the projection is one-third more than its height of one diameter. Further rules dealing with minor projections and the position of the modillions, dentils, etc., will be supplied by a study of the plates and tabulated dimensions.

Pedestal. Finally, the pedestal, if any, should be divided vertically into four parts; the lower part is ruled off for the height of the plinth, one-third of the second part for the height of the base, and one-half of the top part for that of the cap. The projection of the die is equal to that of the base of the column, and the plinth and the cap of the pedestal extends beyond this for a distance equal to the height of the base of the pedestal previously obtained.

The above dimensions will all be found in the subjoined table, which represents an endeavour to bring together, in a form suitable for reference, sufficient information to make any glaring disproportion impossible.

A few of the minor divisions are only approximations; they will, however, be found to be sufficiently accurate for any but large detail drawings, in which it is not desirable to destroy all individuality by rigorous mechanical rules.

On the left hand will be found the dimension required and, in the intermediate column the fraction for each Order of the previously ascertained unit given in the right-hand column.

Plate I.

Plate I. represents the four Orders drawn to a common vertical height.

The pedestal may or may not be required and, if used, it is to be regarded as an addition to the Order, the relative dimensions of the parts of which are not altered by its removal or introduction.

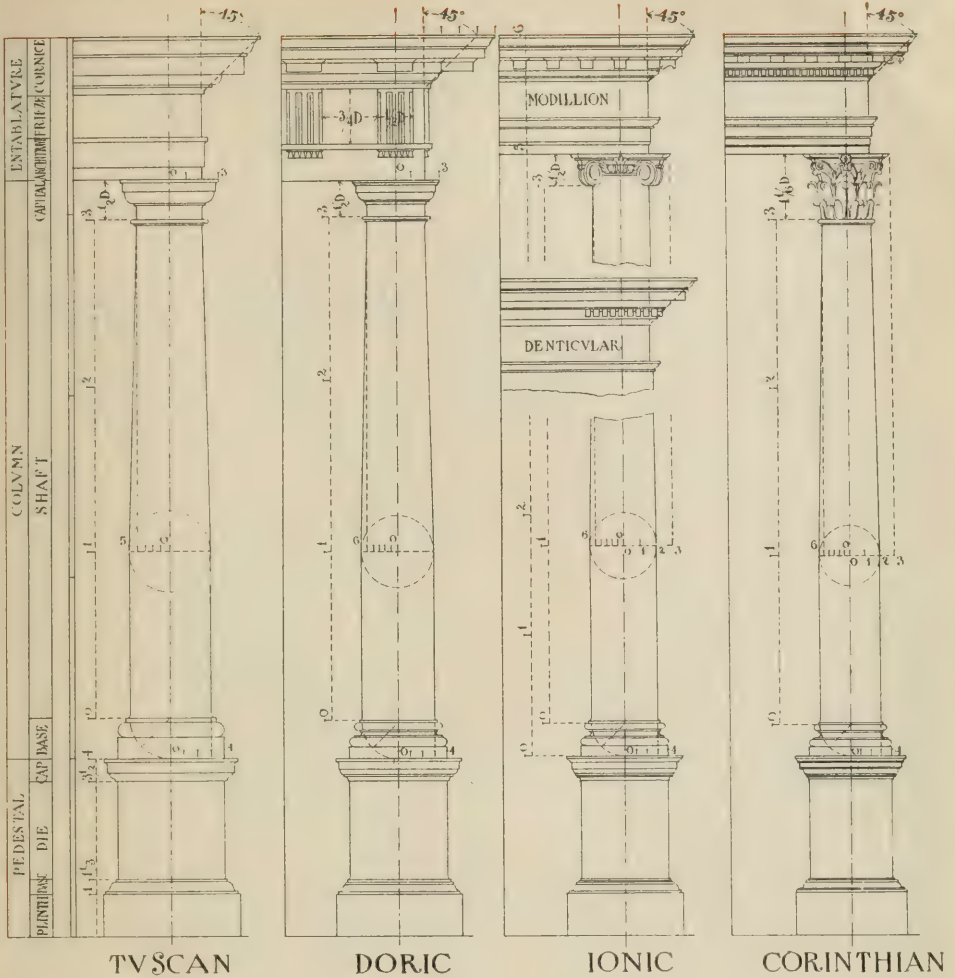
The diameter of the column (by which is meant the diameter of the shaft following its lower cincture) is the ruling dimension from which most of the others are obtained, and the smaller circumference of the top of the shaft always coincides with the frieze line from which all the projections of the entablature are set out.

In judging the value of such projections it should be borne in mind that in execution the higher vertical faces of the composition will usually be much foreshortened to the observer and that there will be a consequent increase in the comparative value of neighboring projections.

A perusal of the table will indicate those dimensions which all the Orders have in common, but for convenience of reference they are further summarized thus:

Height of Pedestal, $\frac{1}{2}$ total height of Order.

PLATE 1.



- Height of Plinth, $\frac{1}{4}$ height of Pedestal.
- Height of Pedestal Base, $\frac{1}{8}$ height of Pedestal Plinth.
- Height of Pedestal Cap, $\frac{1}{2}$ height of Pedestal Plinth.
- Projection of Cap and Plinth, $\frac{1}{8}$ height of Pedestal Plinth.
- Projection of Corona over Die, $\frac{3}{4}$ projection of Pedestal Cap.
- Height of Column Base, $\frac{1}{2}$ diameter of Column.
- Projection of Base over Shaft, $\frac{1}{8}$ semi-diameter of Column.

Pilasters. The general proportions allotted to the columns of the Orders apply also to pilasters, which may be regarded as columns square on plan, but almost universally deeply engaged. The projection of pilasters must be regulated by circumstances. If impost mouldings or other projections stop upon them, as on the inner wall of an arcade, these projections must be sufficient to take the mouldings, and if they line with engaged columns crowned by an entablature, they must have a projection similar to the columns, and therefore in such cases never less than a semi-diameter. Apart from these

considerations, the projection should be about one-fourth of the diameter. Pilasters may be fluted or plain; if the former, the flutes should be, as far as possible, the same size as those of the adjoining columns, and always an odd number.

On plain faces 7 flutes (occasionally 9) are used, and therefore in the above case 4 flutes (or 5) would be employed on each side of the re-entering angle. The returned sides of pilasters should never be fluted unless the projection is as much as half of a diameter. The diameter assigned to a pilaster will be that of a column (if any) used in conjunction with it. The shaft may or may not be diminished.

If the pilaster stand alone it is best formed with the same top and bottom diameter, but if a column stand in front of it then it should be diminished to the same extent as the column. Entasis is not usually given to pilasters.

Unless columns and pilasters are monoliths the shafts should be built up of three drums and not two, as a central joint, unless exceptionally well executed, has a very disagreeable appearance.

**"Practical Notes for Architectural Draughtsmen: The Orders and their Application,"
Tabulated Dimensions of the Orders. Arranged Progressively as Required for Use.**

Dimension required.		Tuscan.	Doric.	Ionic.	Corinthian.	Dimension 1.
No Pedestal	Height of Entablature					Total height of Order.
With Pedestal	Height of Pedestal					" " " " less Pedestal.
THE COLUMN.						
Vertical	Diameter of Shaft					Height of Order less Entablature and Pedestal.
	Height of Base					Diameter of Shaft.
	Base Plinth					" " " " less Plinth.
	Lower Torus					" " " " lower Torus.
	Upper Torus					" " " "
	Upper Torus and fillet under Capital					Diameter of Shaft.
Horizontal	Capital					Height of Capital (Corinthian less Abacus).
	Necking					" " " " " "
	Top of Neck to top of Ovolo					" " " " " "
	Abacus					" " " " " "
Horizontal	Astragal and fillet					Semi-diameter of Shaft.
	Fillet below Astragal					Height of Astragal and Fillet.
	Projection of Base beyond Diameter					Semi-diameter of Shaft.
	Upper Torus					" " " "
	Diameter of Shaft at Top					" " " "
	Projection of Cap over Shaft at Top					Semi-diameter of Shaft at Top.
Vertical	Cap over Shaft at Base					Semi-diameter of Shaft.
	Head at top of Shaft					" " " "
	THE ENTABLATURE.					
	Height of Architrave					Height of Entablature.
	Frieze					" " " "
	Cornice					" " " " Cornice.
Vertical	Fillet and Cyma					" " " "
	Cyma					" " " "
	Base of Corona to top of Ovolo					" " " "
	Top of Ovolo to Frieze					" " " "
	Total projection of Architrave over top diam. of Shaft					Height of Entablature.
	top face of Architrave					" " " "
Horizontal	Height of Cornice over Frieze					" " " " Cornice.
	Inset of Corona from top of Frieze					" " " "
	Length of Modillions (or Dentils)					" " " "
	1/2 Breadth of Modillions (or Dentils)					" " " "
	Space between Modillions (or Dentils)					" " " "
	Top of Ovolo to Frieze					" " " "
Vertical	THE PEDESTAL.					
	Height of Plinth					Height of Pedestal.
	Base					Plinth.
	Cyma of Base					" " " " Base.
	Fillet below Cyma					Fillet above Cyma.
	Cap					Height of Plinth.
Horizontal	Base of Corona to top of Cap					" " " " Cap.
	Projection of Cap and Plinth over Die					Base of Pedestal.
Horizontal	Corona of Cap over Die					Projection of Cap over Die.

Note.—The "Diameter" is always the greatest diameter of the drum of the Column. M. refers to the Modillion Cornice. D. to the alternative Dentil Cornice.

PLATE 2.

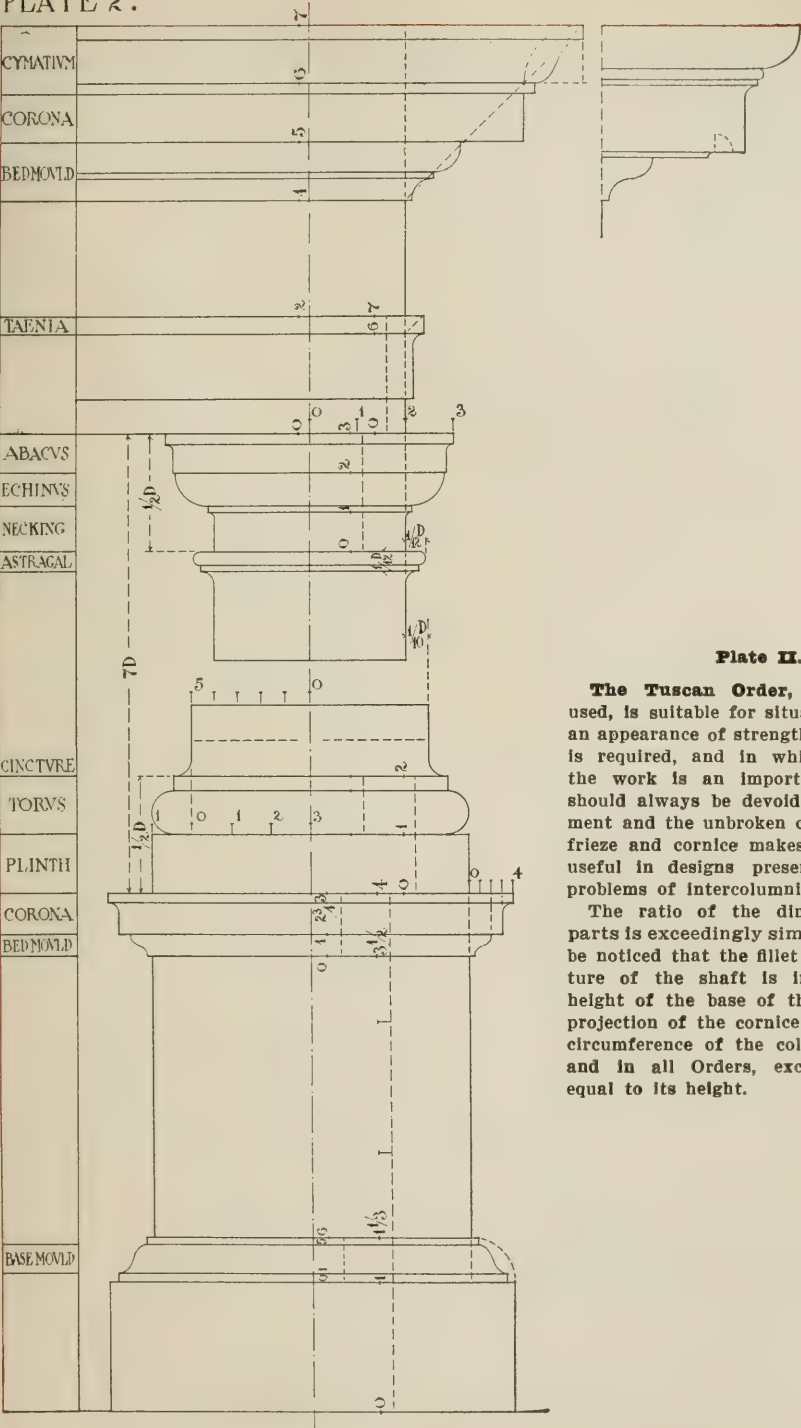


Plate II.

The Tuscan Order, though seldom used, is suitable for situations in which an appearance of strength and simplicity is required, and in which the cost of the work is an important factor. It should always be devoid of any enrichment and the unbroken character of the frieze and cornice makes it particularly useful in designs presenting awkward problems of intercolumniation.

The ratio of the dimensions of its parts is exceedingly simple. It should be noticed that the fillet below the cincture of the shaft is included in the height of the base of this Order. The projection of the cornice over the upper circumference of the column is, in this and in all Orders, except the Doric, equal to its height.

TUSCAN

PLATE 3. MUTULE CORNICE

DENTICULAR CORNICE

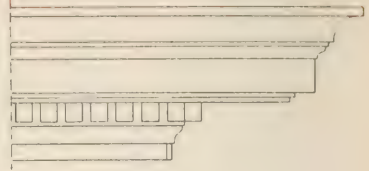
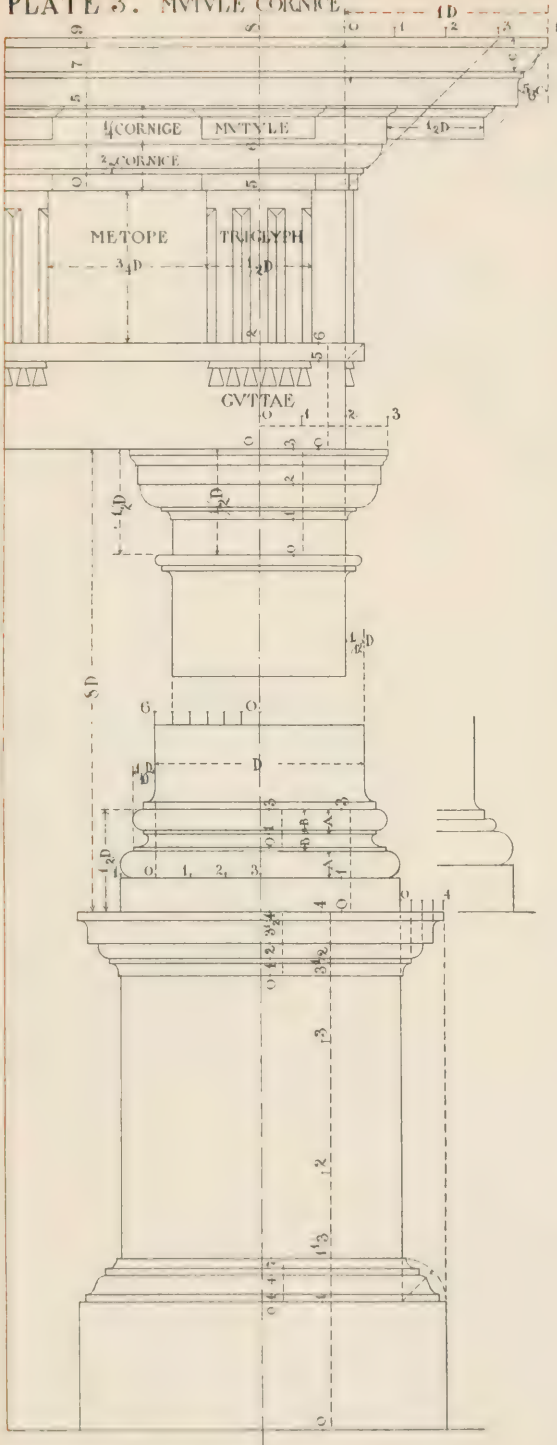


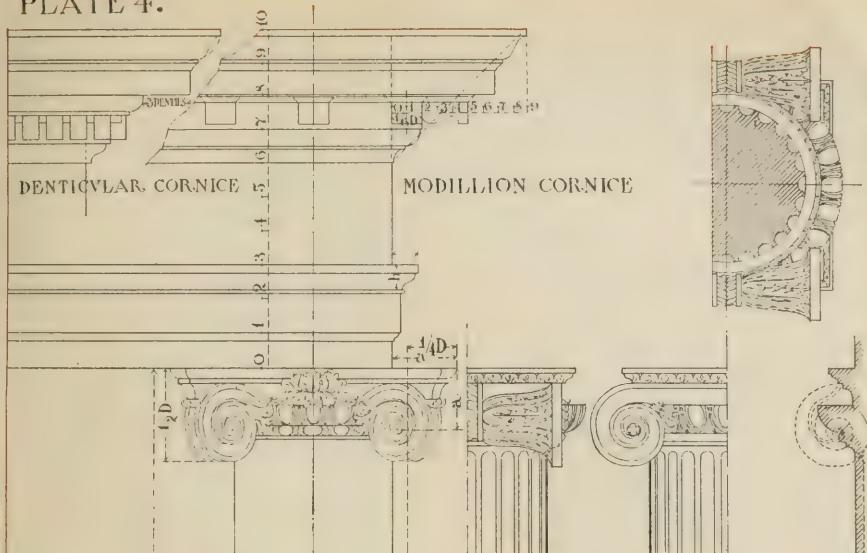
Plate III.

The Doric Order is always effective when used in lower storeys, arcades, and door and window openings, but owing to the triglyphs upon the frieze, which must fall centrally over the columns, it is the most difficult to deal with when spacing is in question.

The dimensions of the cornice do not lend themselves to any simple ratio and its projection is always greater than that adopted for the other Orders. The 45° line from the top of the frieze at once gives the bed mould of the mutule course, and one-third of the height of the cornice added to the top projection of this guiding line gives the total projection, while the mutules are one-half a diameter in side elevation. Some considerable modifications of the Order, as here represented, will be found to exist in many recognised examples. Occasionally the mutules are dispensed with, and their bed mould is cut to form a dentil course, as in the Theatre of Marcellus. The cyma crowning the cornice is often replaced by a cavetto, while the Doric base (shown alternatively on the plate) sometimes replaces the more graceful attic base. When this base is used, the upper fillet should be included in the height of the base, as in the Tuscan Order.

DORIC

PLATE 4.



CVSHION CAPITAL

Plate IV.

The Ionic Order shows smaller variations from the pure Classic examples than any other, and its proportions are fairly simple.

Two styles of cornices are, however, used, the modillion and the dentil cornice, and although the method adopted by Gibbs of giving prominence to the former has been followed, it should be stated that the latter is more generally found in old examples, whilst the former is preferred by Palladio.

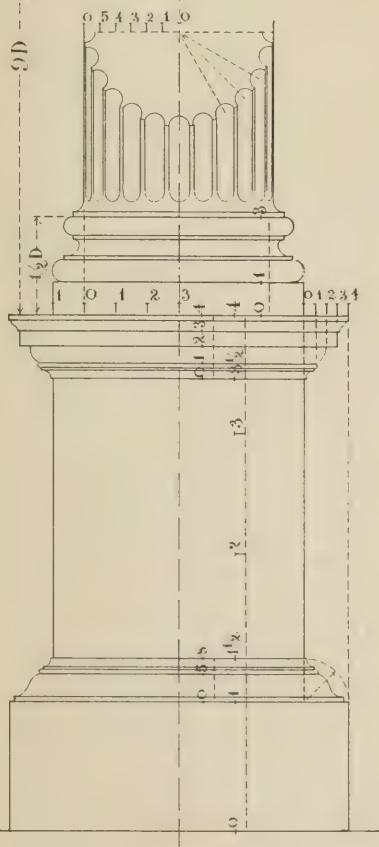
Represented side by side upon the plate the extent of the variation is easily discernible. A modillion or dentil should always be bisected by the centre line of the column and the spacing determined by the distance of this line from the frieze, as set out upon the drawing. The frieze is always plain and in larger works it is, preferably, kept flat. In smaller compositions, however, when narrow or when used over doors and windows a pulvinated frieze may be adopted with good effect.

The earlier alternative form of the Ionic capital in which the faces of the volutes are parallel to the plane of the elevation (not shown upon the drawings) may, of course, be substituted for the capital with angle volutes at 45°, though the latter has usually a much more graceful effect, particularly in small compositions. Of course, the geometrical method for setting out the volutes cannot be used in drawing such capitals in ordinary elevation. It should be noticed that the height of the capital in this Order is measured from the soffit of the volutes.

The centre of the eye is one-third of the height of the capital from its bottom and is in elevation placed just outside the top circumference of the shaft, while the horizontal fillet at the top of the shaft is immediately below the eye.

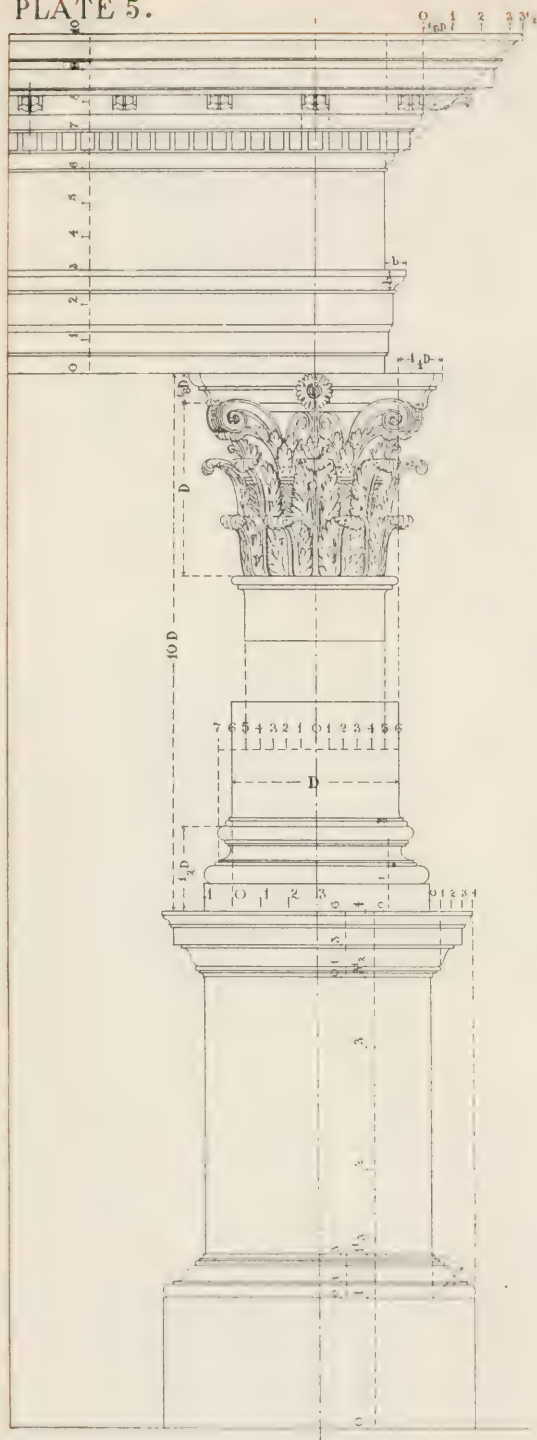
When the column is fluted the width of the fillets should be one-fourth to one-third that of the flutes. The flutes generally number twenty or twenty-four; in the latter case the simple method of setting them out on plan, as shown on the drawing, will be found of service.

The attic base is always used with the Ionic Order.



IONIC

PLATE 5.



CORINTHIAN

Plate V.

The Corinthian Order has been represented with considerable variations from the original type.

The Ionic entablature was often used by the ancients, supported by Corinthian columns, and the Corinthian cornice itself, though here represented with a dentil band, is often found without one. No general rule appears to exist for spacing the modillions or for their dimensions, the ratio of the width of the modillion to the space between two of them varying from $1:1\frac{1}{2}$ to $1:2\frac{1}{2}$, and again the number of the dentils between the modillions varies from 2 to 5 in different examples.

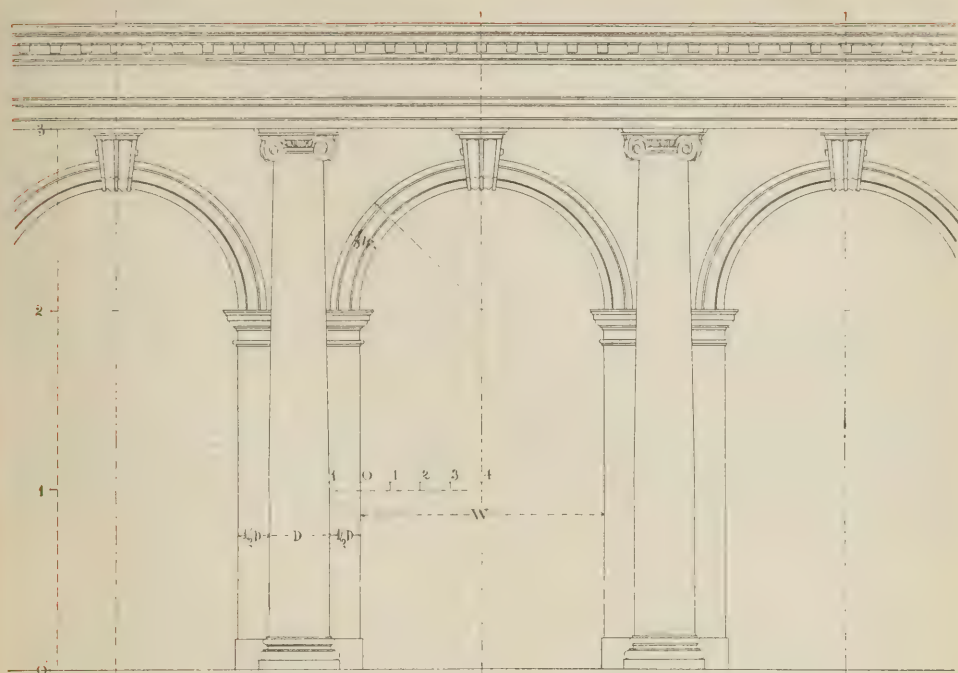
Both features should be symmetrically placed with reference to one another and to the centre line of the column, a point often neglected. To secure this result the following method is recommended:—Draw a modillion one-sixth of the diameter of the column in width, arranged symmetrically over the centre line of the column. Place another with its outside edge three and a half times its width within the total projection of the cornice, and thus obtain the spacing between the blocks. Divide the distance between two modillion centres into 15 parts, give two to a dentil, to be placed symmetrically under a modillion, and one to each space between the dentils, which will be found to bring the inside edge of the last dentil before the return, on the frieze line.

The form and projection of the leaves of the capital are largely matters of individual taste, but the general method of their arrangement will be evident after examining the drawing. It may, however, be noted that the eye of the volute is just outside the lower circumference of the shaft, and that the tiers of leaves divide the capital below the abacus into three approximate equal horizontal sections.

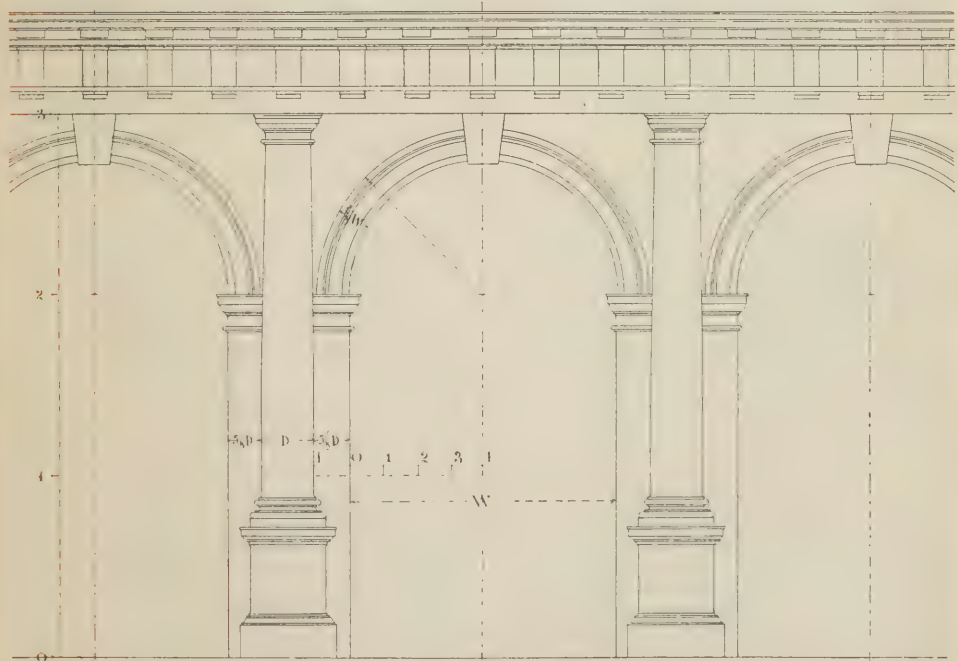
The column may or may not be fluted as in the Ionic Order.

The attic base, as used in the Ionic Order, is very generally employed—in fact, it is often preferable to adopt it, omitting the additional mouldings shown, for the sake of variety, on the drawing

PLATE 6.



IONIC



DORIC

Plate VI.

The relations and dimensions given in this and similar subsequent plates must, therefore, be looked upon as necessarily somewhat elastic. At the same time, such dimensions as are given should not be disregarded, but considered in the light of proportions to be attained as far as the exigencies of the plan will admit.

The spacing of arcading dealt with in this plate should be governed by the height of the space to be treated, and it will be found that the best effects are obtained when the widths of the

seen that a relation exists between the diameter of the column, the width of the pilaster, and the width of the opening. Again, the diameter of the column relatively to the opening will be influenced by the presence, or absence, of a pedestal to the Order. The summary shown, collected from Gibbs's work, giving the dimensions to be aimed at in order to comply with the above relations, will be found useful:

The height of the impost should always be about two-thirds of the height from the ground to the soffit of the architrave of the Order, whether a pedestal is in use or not.

Diameter of Column = 1.

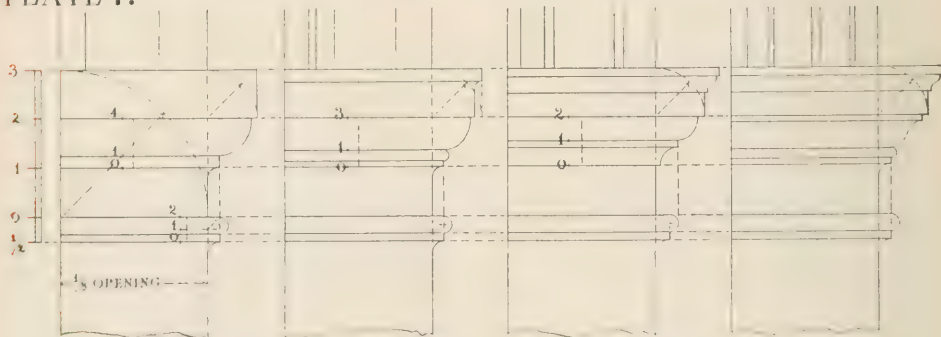
	Tuscan.		Doric.		Ionic.		Corinthian.	
	No Ped.	With Ped.	No Ped.	With Ped.	No Ped.	With Ped.	No Ped.	With Ped.
Width of bay centre to center	6	7	6 1/4	7 1/2	6	7 1/2	6 5-12	8 1/6
Width of one pilaster	1/2	2/3	1/2	5/8	1/2	5/8	1/6	7-10
Width of opening	4	4 2/3	4 1/4	5 1/4	4	5 1/4	4 1/8	5 5/8

openings approximate to half of their height, and when the total width of the piers lies between one-half and two-thirds of that of the opening.

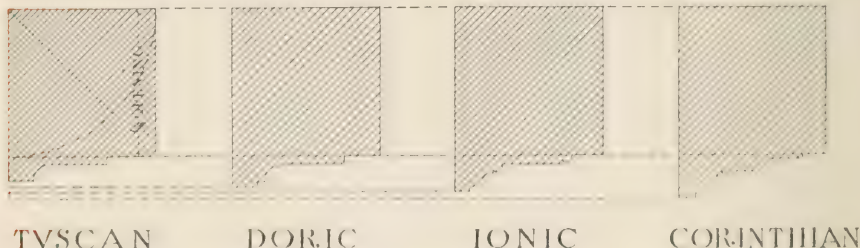
The spacing must also be considered in reference to the Order employed, so that when triglyphs, or modillions, are placed centrally over the columns their proper spacing may be interfered with as little as possible. It will thus be

The archivolt or moulding running round the arch should be the same width as the pilaster (less any necessary clearance for the mouldings)—that is, about one-eighth of the width of the opening, which should also be the height of the impost cap to the bottom of the necking. Further details as to the members will be found on Plate VII.

PLATE 7.



IMPOSTS AND ARCH MOVLDS



TUSCAN

DORIC

IONIC

CORINTHIAN

Plate VII.
Impost Mouldings.

Details are here given of impost mouldings, with their archivolts, suitable for the different Orders. The divisions of the impost are all simple and similar in each example, the height of the corona and of its mouldings above, if any, being equal to the height of the mouldings below, which, again, are equal to the necking. The band and fillet below the necking are one-sixth of the height of the impost, the band being double the height of the fillet. The projection of the impost beyond the line of the pilaster is equal to the height of the corona and member over in the

first two Orders, while the projection of the corona itself is equal to this height in the last two.

The pilaster is square on plan, and, therefore, the plan of the archivolt is represented by this square upon which the mouldings are placed. An examination of these mouldings will show that they resemble the architraves given for their respective Orders, and their forms admit of similar variations. It will be noticed that the innermost face is always in the plane of the face of the pilaster, while the projection of the moulding at the extrados increases from about one-quarter the width of the whole archivolt in the Tuscan to one-third in the Corinthian Order.

SUBJECT INDEX.

System of Classification for Filing Data, Drawings, Plates, Catalogues, Etc.,
in Architects' and Contractors' Offices.

INTRODUCTION.

The decimal system of classification was devised and elaborated by Mr. Melvil Dewey, formerly director of the New York State Library. This system was intended primarily for the use of librarians in the classification and arrangement of books and pamphlets, but it was soon found that the system also furnished a simple and effective means of classifying, indexing and filing literary matter of all kinds. Engineers have found it useful for indexing technical data and information, catalogs, reports, card systems, drawings, etc., and it has been found equally useful by manufacturing and business concerns.

The scheme and a considerable amount of the subject matter which follows has been obtained from the original publication of Mr. Dewey, but the outline on "Building," 690 to 699, has been compiled new by the Editor. The purpose of rewriting being to bring the Index more nearly in accord with the trade groups and divisions of modern practice. The index on "Ancient," "Mediaeval" and "Modern Architecture," 722 to 724 inclusive, has been completely revised in order to bring the same down to date in accord with the latest discoveries in the realm of the history of Architecture. For the revision of this material we are deeply indebted to Prof. Rexford Newcomb, Professor of Architecture of the University of Illinois. For its co-ordination with Dewey to Miss Winifred Fehrenkamp, Librarian of the Ricker Library of Architecture, also of the University of Illinois.

EXPLANATION OF THE DECIMAL SYSTEM.

The essential characteristic of the Dewey System is its method of division and subdivision. The entire field of knowledge is divided into nine chief classes numbered by the digits from 1 to 9. Matter of too general a nature to be included in any of these classes is put into a tenth class and indicated by 0. The following are the primary classes of the Dewey System:

- 0 GENERAL WORKS
- 1 PHILOSOPHY
- 2 RELIGION
- 3 SOCIOLOGY
- 4 PHILOLOGY
- 5 NATURAL SCIENCE
- 6 USEFUL ARTS
- 7 FINE ARTS
- 8 LITERATURE
- 9 HISTORY

Each of these classes is again divided into nine divisions, with a tenth division for general matter, and each division is separated into nine sections. The sections are again sub-divided and the process may be carried as far as desired.

It is thought that this system will be especially valuable to architects for classifying drawings, catalogs, reports and technical data. Our space is too limited to publish the complete work, nor is it desirable. Should any one be sufficiently interested to go into the matter thoroughly, they should have Mr. Dewey's complete text on the subject. We are particularly concerned as practitioners of the profession of architecture with divisions 6 and 7, "Useful Arts" and "Fine Arts," comprising the following subject numbers:

600 USEFUL ARTS

- 610 MEDICINE
- 620 ENGINEERING
- 630 AGRICULTURE
- 640 DOMESTIC ECONOMY
- 650 COMMUNICATION AND COMMERCE
- 660 CHEMICAL TECHNOLOGY
- 670 MANUFACTURES
- 680 MECHANIC TRADES
- 690 BUILDING

Omitting all sub-divisions of this topic, with the exception of 690 "Building," we publish the sub-divisions of same. As distinguished from "Architectural Construction," "Building" has to do more particularly with the processes of construction and matters pertaining to trades and materials involved in the construction of buildings, should be more properly classified under "Building", while matters as to types and component architectural parts are more properly classified under **Architectural Construction**.

690 BUILDING — Materials and Trades.

- 690.0 GENERAL.
 - .01 History.
 - .011 History of Materials.
 - .012 History of the Art of Building.
 - .013 Biography of Architects.
 - .014 Biography of Builders.
 - .015 Biography of Craftsmen.
 - .02 Organization of Construction.
 - .03 Finance of Building.
 - .03-A Thru Building & Loan Associations.
 - .03-B Thru Cooperative Ownership.
 - .03-C Thru Bond Issue.
 - .03-D Thru Straight Loan.
 - .03-E Thru First and Junior Bonds.
 - .04 Operation of Buildings.
 - .05 General Works on the Occupation and Art of Building.
 - .50 Encyclopaedia.
 - .051 Manuals.
 - .052 Handbooks.
 - .053 Receipts.
 - .054 Periodicals.
 - .055 Society Proceedings.
 - .056 Trade Unions, Guilds, Etc.
 - .057 Contractor's Associations.
 - .058 Material Dealer's Associations.
 - .059 Insurance.
- 690.1 EDUCATION OF PERSONNEL CONCERNED IN BUILDING.
 - .11 Education of Designers.
 - .12 Education of Supervisors.
 - .13 Education of Managers.
 - .14 Education of Craftsmen.
- 690.2 BUILDING MATERIAL IN THE ABSTRACT.

(All special material should be classified under the appropriate trade.)
- 690.3 PLANS FOR BUILDINGS.
 - .30 Incidents to the Preparation of Drawings.
 - .301 Drafting Room Supplies.
 - .302 Drafting Methods.
 - .303 Cost Accounting.
 - .31 Preliminary Studies.
 - .32 General Drawings.
 - .33 Scale Details.
 - .34 Full Size Details.
- 690.4 SPECIFICATIONS FOR BUILDINGS.
 - .40 Matter Pertaining to All Trades.
 - .40-A General Conditions of the Contract
 - .40-B Form of Agreement.
 - .40-C Form of Bid.

- .40-D Form of Advertisement.
- .40-E Form of Invitation to Bid.
- .41 Earth Working and Transportation Trades.** (See File 691.)
- .41-A Preparation of Site.
- .41-B Wrecking.
- .41-C Shoring and House Moving.
- .41-D Excavating.
- .41-E Caisson and Special Foundations.
- .41-F Construction Plan.
- .41-G Maintenance Contract.
- .41-I Grading and Filling.
- .41-J Preparation of Soil, Sodding and Seeding.
- .41-K Planting.
- .41-Z Miscellaneous Labor not Otherwise Classified.
- .42 Mortar Using Trades.** (See File 692.)
- .42-A Masonry Materials.
- .42-B Foundation Work.
- .42-C Concrete Work.
- .42-D Stone Work.
- .42-E Brick Work.
- .42-F Fireproofing, Furring and Partitions.
- .42-G Architectural Terra Cotta.
- .42-H Paving.
- .42-I Smoke Stacks of Masonry.
- .42-J Plastic Reinforcement, Lathing and Furring.
- .42-K Plastering.
- .42-L Models, Clay and Plaster.
- .42-M Plastic Insulation, Pipe Covering, Etc.
- .42-N Marble and Substitutes (Including Slate, Structural Glass Terrazzo-Slabs, Etc.)
- .42-O Tile and Substitutes.
- .42-P Terrazzo Blocks.
- .42-Z Miscellaneous Mortar Using Trades not Classified.
- 690.43 Wood-Working Trades and Hardware.** (See File 693.)
- .43-A Wood-Working Materials and Methods.
- .43-B Carpentry.
- .43-C Rough Carpentry Hardware.
- .43-D Finish Hardware.
- .43-E Revolving Doors.
- .43-F Special Doors, Folding, Rolling, Etc.
- .43-G Screens, Wood Frame, for Insects.
- .43-H Wood Registers, Screens, Etc.
- .43-I Mantels, Etc., of Wood.
- .43-J Wood Specialties Show-Cases, Cabinets, Etc.
- .43-K Seating for Assembly Pews, Opera Chairs, Etc.
- .43-L Wood Platform Furniture, Pulpits, Lectern Sedilia, Altars, and Altar Furniture.
- .43-M Portable Furniture of Wood, Chairs, Etc.
- .43-N Domestic Furniture.
- .43-Z Miscellaneous Woodworking Trades not Otherwise Classified.
- 690.44 Heavy Metal Trades** (employing metal heavier than No. 10 gauge). (See File 694.)
- .44-A Metal Materials and Methods.
- .44-B Structural Metal (over No. 10 gauge).
- .44-C Miscellaneous Metal.
- .44-D Ornamental Metal (over No. 10 gauge).
- .44-E Vaults, Safes, Vault Doors, Etc.
- .44-F Solid Metal Sash.
- .44-G Heavy Metal Doors and Shutters.
- .44-H Fire Escapes.
- .44-I Stairs, Metal.
- .44-J Fences, Metal.
- .44-Z Miscellaneous Heavy Metal Trades not Otherwise Classified.
- 690.45 Sheet Metal Trades** (employing metal of No. 10 gauge or less. See File 695).
- .45-A Sheet-Metal Materials and Methods.
- .45-B Ordinary Sheet-Metal.
- .45-C Slate and Tile Roofing.

- .45-D Ventilating Ducts, Fans, Stacks and Furnaces, Etc.
- .45-E Hollow Metal Windows.
- .45-F Metal Clad Wood Doors.
- .45-G Enamel Sheet-metal Ceilings.
- .45-H Art Sheet-metal Trim and Doors.
- .45-I Enamel Sheet-metal Cabinets.
- .45-J Enamel Sheet-metal Lockers.
- .45-K Enamel Sheet-metal Radiator Covers and Seats.
- .45-L Enamel Sheet-metal Toilet Partitions.
- .45-M Metal Furniture.
- .45-N Sheet-metal Utensils.
- .45-O Drawn Sheet Metal Store Fronts, Etc.
- .45-Z Miscellaneous Sheet Metal Trades not Otherwise Classified.
- 690.46 Brush, Broom and Swab-Using Trades** (See File 696.)
- .46-A Brush Trade Materials and Methods.
- .46-B Water-proofing Membrane and Mastic or other Viscous Compositions mopped, broomed or swabbed in place.
- .46-C Composition Roofing.
- .46-D Plain Painting and Varnishing.
- .46-E Decorations (Plain, Painted or Water Color).
- .46-F Hangings, Fabrics, etc.
- .46-G Upholstery.
- .46-H Window Shades.
- .46-I Mastic Tile and Sheet Floor Covering.
- .46-J Rubber Tile and Sheet Floor Covering.
- .46-K Cork Tile and Sheet Floor Covering.
- .46-L Carpets, Linoleums, Etc., Floor Covering.
- .46-M Plain Glass and Glazing.
- .46-N Art Glass and Glazing.
- .46-Z Miscellaneous Brush Trades not Otherwise Classified.
- 690.47 Pipe Trades.** (See File 697.)
- .47-A Pipe Trades Materials and Methods.
- .47-B Sanitary Plant.**
- .47-B-1 Sewerage and Drainage.
- .47-B-2 Sewerage and Bilge Pumps.
- .47-B-3 Sewerage Disposal.
- .47-B-4 Plumbing.
- .47-B-5 Tanks and Towers for Water Supply, Stand Pipes.
- .47-B-6 Gas Fitting.
- .47-B-7 Gas Stoves, Etc.
- .47-C Sprinkler Fitting.**
- .47-C-1 Storage Tanks and Towers.
- .47-C-2 Pressure Tanks, Etc.
- .47-C-3 Pumps.
- .47-D Boiler Plant.**
- .47-D-1 Steel Stacks and Breeching.
- .47-D-2 Tanks for Water Storage.
- .47-D-3 Tanks for Oil Storage.
- .47-D-4 Super Steam Heaters.
- .47-D-5 Tube Blowlers.
- .47-D-6 Tube Cleaners.
- .47-D-7 Furnaces.
- .47-D-8 Stokers.
- .47-D-9 Coal Handling Equipment.
- .47-D-10 Ash Handling Equipment.
- .47-D-11 Pulverized Coal Burners and Pulverizers.
- .47-D-12 Oil Burners.
- .47-D-13 Gas Burners.
- .47-D-14 Draft Inducer Blowers.
- .47-D-15 Soot Burners.
- .47-D-16 Fuel Economizers.
- .47-D-17 Smoke Indicators.
- .47-D-18 Feed Water Heaters.
- .47-D-19 Boiler Feed Pumps.
- .47-D-20 Service Pumps.
- .47-D-21 Fire Pumps.
- .47-D-22 Governors for Pumps, Etc.
- .47-D-23 Water Softeners.
- .47-D-24 Lubricators.
- .47-D-25 Injectors for Compound.
- .47-D-26 Injectors for Water.
- .47-D-27 Feed Water Regulators.
- .47-D-28 Draft Regulators.
- .47-D-29 Flow Meters.

- .47-D-30 Draught Gauges.
- .47-D-31 CO₂ Recorders.
- .47-E Steam and Hot Water Fitting.**
- .47-E-1 Vacuum Pumps.
- .47-E-2 Vacuum Valves.
- .47-E-3 Miscellaneous Specialties.
- .47-F Steam Power Plant.**
- .47-F-1 Engines.
- .47-F-2 Compressors.
- .47-G Vacuum Cleaning Plant.**
- .47-H Mechanical Refrigeration.**
- .47-H-1 Tanks.
- .47-H-2 Compressors.
- .47-H-3 Cooler Towers.
- .47-I Mechanical Ventilation.**
- .47-I-1 Heating Units.
- .47-I-2 Cooling Units.
- .47-I-3 Air Washers.
- .47-I-4 Fans and Engines.
- .47-Z Miscellaneous Pipe Trades not Otherwise Classified.

690.48 Wire and Conduit Trades (See File 698).

- .48-A Wire Trades Materials and Methods.
- .48-B Electrical Conduit and Wiring.
- .48-C Lighting Fixtures.
- .48-D Electrical Power Work.
- .48-E Electric Signs.
- .48-F Private Telephone System.
- .48-G Clock System.
- .48-H Signal Clock System.
- .48-I Fire Alarm System.
- .48-J Burglar Alarm System.
- .48-K Projecting Machines.
- .48-Z Miscellaneous Electrical Trades not Otherwise Classified.

690.49 Machinery and Miscellaneous Trades (See File 699).

- .49-A Machinery and Miscellaneous Materials and Methods.
- .49-B Elevators.
- .49-B-1 Passenger Elevators.
- .49-B-2 Freight Elevators.
- .49-B-3 Dumbwaiters.
- .49-C Conveying Machines.
- .49-D Mechanical Cleaners.
- .49-E General Machinery.
- .49-F Foundry Equipment.
- .49-G Insulation, Pipe Covering, Etc. (See File 690.42-M).
- .49-H Refrigerators, Coolers and Freezers.
- .49-H-1 Ice Boxes.
- .49-H-2 Electric Refrigeration.
- .49-H-3 Gas Refrigeration.
- .49-I Laundry Equipment.
- .49-J Kitchen Equipment.
- .49-K Laboratory Equipment.
- .49-L Gymnasium Equipment.
- .49-Z Miscellaneous Equipment not Otherwise Classified.

690.5 ESTIMATES FOR BUILDINGS.

- .5-A Cube System.
- .5-B Area System.
- .5-C By Trades.
- .5-D By Quantity Survey.

690.6 CONTRACTS AND GENERAL CONDITIONS.

690.7 SUPERVISION OF CONSTRUCTION AND ACCOUNTS.

690.8 PROFESSIONAL SERVICES.

- .80-A Remuneration, Fees, Commissions.
- .80-B Duties, Relationships, Etc.
- .80-C Responsibility, Etc.
- .80-D License or Registration.
- .81 Architect.
- .82 Structural Engineer.
- .83 Mechanical Engineer.
- .84 Sanitary Engineer and Surveyors.
- .85 Electrical Engineer.
- .86 Illuminating Engineer.
- .87 Clerk of the Works, Draftsmen, Stenographers and Employees.
- .88 Building Construction Manager.
- .89 Specialists not otherwise Classified.

690.9 LAWS AND RULES CONTROLLING BUILDING.

- .91 State or General Laws.
- .92 Municipal Ordinances, Rules, Etc.
- .93 Trade Rules.

- .94 Findings, National Joint Board of Jurisdictional Awards.
- .95 Lien Laws.
- .96 Underwriters' Rules.
- .97 Public Service Company's Rules.
- .98 Liabilities of:
- .981 Architects.
- .982 Contractor.
- .983 Workman.
- .984 Owner.
- .985 Bondsman.
- .986 Liability Insurance Co.
- .987 Adjoining Property Owner.
- .988 Public.
- .989 Any Other Responsibilities.

691 EARTH-WORKING, TRANSPORTATION AND TEAMING TRADES.

691.0 TOOLS, UTENSILS, APPARATUS, ETC.

- .01 Shovels, Picks, Drills, Bars, Wheelbarrows, Etc.
- .02 Plows, Scrapers, Trucks, Carts, Wagons, Teams, Tractors.
- .03 Excavating, Trench and Mining Machinery.
- .04 Hoists, Cranes, Pile Drivers, Conveyors, Hoisting Engines, Etc.
- .05 Dummy Railroad Equipment, Tracks, Cars, Etc.
- .06 Soil Testing Apparatus.
- .07 Shoring, Sheet Piling, Piling, Caissons, Scaffolding, Etc.
- .071 Wood.
- .072 Metal.
- .073 Concrete.
- .08 Blasting Powder and Apparatus.
- .09 Rock Crushers.

691.1 MATERIALS TO BE REMOVED.

- .11 Common Earth, Clay, Sand, Gravel, Hardpan, Conglomerate Rock, Etc.
- .12 Trees, Shrubs, Etc.
- .13 Rubbish, Etc.
- .14 Buildings, Vaults, Pipes, Cisterns, Etc.

691.2 DISPOSAL OF MATERIALS.

- .21 Stacking.
- .22 Cartage.
- .23 Dumps.

691.3 UTILIZATION OF MATERIALS.

- .31 Sand and Gravel Stored for Mortar.
- .32 Black Earth for Top Fill.
- .33 Crushed Rock for Aggregate.
- .34 Cleaning and Stacking Building Material for Use in New Building.
- .35 Re-Planting and Protection of Trees and Shrubs.

691.4 FILLING & GRADING MATERIAL.

- .5 FERTILIZER. SOIL TREATMENT.
- .6 NURSERY STOCK, SODDING AND SEEDING.
- .7 DRAINAGE MATERIAL.
- .8 FROST PROTECTION.
- .9

692 MORTAR-USING TRADES — (Inc. Masonry, Plastering, Tile and Marble Setting and the preparation for same).

692.0 MASONRY APPARATUS.

- .01 Mixing Boxes, Platforms, Etc.
- .02 Tools, Hose, Heaters, Etc.
- .03 Mixers for Mortar and Concrete.
- .04 Scaffolding, Horses, Planks, Etc.
- .05 Forms.
- .06 Erection Apparatus, Hoists, Cranes, Etc.
- .07 Shutes and Conveyors.

692.1 MATERIALS FOR MASONRY.

- .11 Liquids, Water, Anti-freezing, Etc.
- .12 Aggregate (a) Sand, (b) Stone Screenings, (c) Gravel, (d) Crushed Stone, (e) Crushed Slag, (f) Cinders, (g) Haydite, Etc.

- .13 **Cementing Materials for Masonry.**
- .131 Limes.
- .132 Hydraulic Cements, (a) Natural, (b) Portland, (c) Miscellaneous.
- .133 Gypsums, (a) Plaster of Paris, (b) Keene's Cement, (c) Miscellaneous.
- .134 Magnesites.
- .135 Asphaltic Cements.
- .136 Composite Cements.
- .137 Other Cements, Unclassified.
- .138 Mortar Color.
- .14 Solids for Masonry.
- .141 Stone.
- .142 Brick, (a) Adobe, (b) Burned Clay, (c) Sand Lime.
- .143 Structural Partition and Load-bearing Tile.
- .144 Terra Cotta, (a) Coping, (b) Ornamental Flue Lining, etc.
- .145 Cement Blocks.
- .146 Composite Blocks.
- .147 Marble, Soapstone, Structural Slate and Glass Substitutes.
- .148 Tile, Paving and Wall.
- .149 Terrazzo Blocks and Slabs.
- .15 **Mason's Hardware.**
- .151 Anchors, Ties, Wall Boxes, Plates, Inserts, Scoopers, Sleeves, Etc.
- .152 Thimbles, Ash and Coal Chutes, Clean-out Doors, Dampers, Grate Bars, Chimney Cap, Vent Gratings, Etc.
- .153 Vault Lights, Sidewalk Doors, Etc.
- .154 Screeds, Metal Expansion Joints.
- .16 **Reinforcing for Masonry.**
- .161 Bar Reinforcement.
- .162 Fabric.
- .163 Metal Lath.
- .164 Wood-lath, Plaster Board.
- .165 Fiber, Hair, etc.
- 692.2 **STONE CONSTRUCTION.**
- .21 Preservatives Treatment.
- .22 Bond, Anchorage, Ties, Lewises, Etc.
- .23 Cutting and Dressing of Stone, Stereotomy, Drips, Weathering, Etc.
- .24 Setting, Joints, Mortar, Bedding, Etc.
- .25 Cleaning and Pointing.
- 692.3 **BRICK CONSTRUCTION.**
- .31 Preservative Treatment.
- .32 Common Brick Work.
- .33 Fire Brick Work.
- .34 Face Brick Work.
- .35 Laying Joints, Mortar, Etc.
- .36 Chases, Fire-Stops, Corbels, Etc.
- .37 Bonds, Anchors, Etc.
- .38 Cleaning and Pointing, Etc.
- .39 Special Brick Work.
- 692.4 **TERRA COTTA CONSTRUCTION.**
- .41 Preservative Construction.
- .42 Bonding, Anchorage, Ties, Etc.
- .43 Structural Tile Walls.
- .44 Structural Tile Floors.
- .45 Ornamental or Decorative Terra Cotta.
- .46 Laying Joints, Mortar, Etc.
- .47 Fitting Around Structural Parts.
- .48 Centers, Supports, Protection.
- .49 Cleaning, Pointing and Repairing.
- .5 **FIREPROOF CONSTRUCTION.**
- .51 Hollow Clay Tile, (a) Hard, (b) Porous.
- .52 Gypsum Tile.
- .53 Concrete.
- .54 Tying, Fitting, Securing.
- .55 Combination Construction.
- .56 Centers, Forms, Etc. (See 692.41 for Wood and 695 for Sheet-Metal.)
- .59 Patching, Repairing.
- 692.6 **CONCRETE CONSTRUCTION.**
- .61 Massive, Caissons, Footings, Retaining Walls, Etc.
- .62 High Duty Concrete.
- .63 Hollow Concrete Building Blocks.
- .64 Ornamental Concrete.
- .65 Concrete Supported on the Ground.
- .66 Paving of Walks, Floors, Drives, Etc.
- .67 Waterproof Concrete.
- .67 Reinforced Concrete.

- .671 Reinforcing Systems, Arranged Alphabetically.
- .672 Forms and Centers. (See 693.41 for Wood; also 695 for Sheet-Metal.)
- .673 Tests and Inspection.
- .674 Data for Experiments.
- .675 Formulae, (a) Vault Construction.
- .676 Special Applications.
- 692.7 **DECORATIVE AND SANITARY WALL AND FLOOR SURFACING.**
- .71 Marble, Soapstone and Slate.
- .72 Structural Glass.
- .73 Terrazzo.
- .74 Tile Mosaic, (a) Ceramic, (b) Marble, (c) Glass.
- .75 Tile, (a) Quarry, (b) Encaustic, (c) Marble, (e) Ornamental, (f) Composition Non-Slip, (g) Slate Flagging, (h) Rubber Tile.
- .76 Sanitary Composition Floors.
- 692.8 **WATER-PROOFING AND HARDENERS.**
- .81 Integral Waterproofing (for brush applied mastic and painting, waterproofing, see File 696).
- .82 Hardeners (a) Surface, (b) Admixed.
- .83 Mortar Colors, Workability Mixtures.
- 692.9 **PLASTER TRADES.**
- .91 Interior Plaster.
- .91(a) Common Lime Plaster.
- .91(b) Gypsum Plaster.
- .91(c) Magnesite.
- .91(d) Portland Cement Plaster.
- .91(e) Lathing.
- .91(f) Special Plasters.
- .92 Exterior Plaster.
- .93 Modeling and Ornamental Plaster.
- 693 **WOOD WORKING TRADES.**
- .0 **APPARATUS, INCIDENTAL TOOLS, ETC.**
- .01 Mechanic's Tools.
- .02 Wood-working Power Machinery, (a) Saws, (b) Planers, (c) Stickers, (d) Sand-papery Machines, (e) Scraping Machines.
- .03 Kilns, Dryers.
- .04 Scaffolding, Ladders, Horses and Benches.
- 693.1 **MATERIALS.**
- .11 Lumber.
- .111 Timber, larger than 6"x6".
- .112 Common Lumber.
- .112 (a) Boards, Furring and Grounds.
- .112 (b) Piece Stuff, Joists and Scantling.
- .112 (c) Shingles, Wood and Composition.
- .113 Finish Lumber.
- .113 (a) Hardwood.
- .113 (b) Soft Wood.
- .113 (c) Flooring.
- .114 Mill Stock.
- .115 Veneers.
- .116 Composition.
- .117 Insulation Papers and Felts.
- .12 Glues.
- .13 Rough Hardware.
- .131 (a) Nails, (b) Spikes, (c) Brads, (d) Hangers, Track, Etc.
- .132 (a) Bolts, (b) Rods, (c) Anchors, Ties, (d) Screws, Etc.
- .133 Rivets.
- .134 (a) Washers, (b) Flitch Plates, (c) Splice Plates.
- .135 Mill Construction Hardware, (a) Stirrups, (b) Hanger, (c) Column Caps, (d) Ties, (e) Box and Wall Anchors, (f) Bearing Plates, Etc.
- .136 Double Hung Sash Hardware, (a) Pulleys, (b) Cords, (c) Chain, (d) Weights, (e) Spring Balances.
- .137 Window Cleaning Hardware.
- .138
- .14 Finish Hardware.
- .141 Hanging Hardware, (a) Butts, (b) Hinges, (c) Pivots, Etc.

- 693
- 142 Controlling Hardware, (a) Bumpers, (b) Strikes, (c) Holders, (d) Hooks, (e) Stays, (f) Adjusters, Etc.
- 143 Fastening Hardware, (a) Old Fashion Latches, (b) Spring Latches, (c) Catches, (d) Fasts, (e) Thumb Bolts, (f) Locks, Etc.
- 144 Trimming Hardware, (a) Pulls, (b) Knobs, (c) Spindles, (d) Roses, (e) Escutcheons.
- 145 Protection Hardware, (a) Kick Plates, (b) Push Plates, (c) Direction Plates or Signs, (d) Push Bars, Etc.
- 146 Operating Hardware, (a) Closers and Checks, (b) Springs, (c) Weights and Pulleys, (d) Window Poles, Etc.
- 147 Weathering Hardware, (a) Weather Strips, (b) Thresholds, (c) Special Drips, (d) Metal Astrigals, (e) Casement Operators, Etc.
- 148 Automatic and Panic Hardware.
- 149 Miscellaneous Hardware not otherwise classified, (a) Wardrobe Hardware, (b) Showcase Hardware, (c) Toilet-room Hardware, (d) Ladder Hardware, (e) Castors, (f) Cabinet Hardware, (g) Gymnasium Apparatus, (h) Mail Boxes and Chutes, (i) Clothes Chutes.
- 693.2 **ORDINARY CONSTRUCTION.**
- 21 Balloon Construction for Frame Buildings.
- 22 Joist Construction for Masonry Buildings.
- 23 Trusses, etc.
- 693.3 **HEAVY TIMBER CONSTRUCTION.**
- 31 Heavy Post and Timber Construction for Frame Buildings.
- 32 Mill Construction for Masonry Buildings.
- 693.4 **AUXILIARY WOOD CONSTRUCTION FOR FIREPROOF BUILDINGS.**
- 41 Centers, Forms, Protective Covering, Scaffolding, Etc.
- 42 Grounds, Attachment Strips, Etc.
- 693.5 **JOINERY AND MILL WORK.**
- 51 Frames and Sash.
- 511 Box Frames, Double Hung Sash.
- 512 Casement Frames, Sash Opening In.
- 513 Casement Frames, Sash Opening Out.
- 514 Frames for Sash Hinged at Bottom, Swinging In at Top.
- 515 Frames for Sash Hinged at Top, Swinging In at Bottom.
- 516 Frames for Sash Hinged at Top, Swinging Out at Bottom.
- 517 Frames for Horizontal Pivoted Sash.
- 518 Frames for Vertical Pivoted Sash.
- 52 Wood Interior Trim.
- 53 Wood Floors.
- 54 Blinds.
- 55 Doors.
- 551 Ordinary Panel and Sanitary Doors.
- 552 Special Revolving Doors.
- 553 Folding, Accordion Doors.
- 554 Rolling Doors.
- 56 Screens.
- 693.57 Mouldings.
- 693.58 Flooring Wood.
- 59 Columns.
- 693.6 **STAIR BUILDING.**
- 693.7 **ORNAMENTAL JOINERY.**
- 71 CABINET WORK, (a) Mantels, (b) Sideboards, (c) Cases, (d) Space Savers, (e) Panel Partitions.
- 72 **WOOD FURNITURE.**
- 693.8 **WOOD CARVING, WOOD LETTERS.**
- 9 **MISCELLANEOUS.**
- 694 **HEAVY METAL TRADES — (Employing Metal heavier than No. 10 gauge).**
- 0 **TOOLS, UTENSILS, APPARATUS, ETC.**
- 694
- 01 Job Machinery.
- 02 Job Tools, Hammers, Sledges, Punches, Tongs, Reamers, Riveters, Forges, Etc.
- 03 Derricks, Cable, Hoisting Machinery.
- 1 **MATERIALS USED IN THE METAL TRADES.**
- 11 Iron Products.
- 111 Cast-Iron.
- 112 Wrought Iron.
- 113 Steel.
- 114 Alloys, (a) Copper Bearing Steel, (b) Nickel Steel, (c) Sheradized Steel.
- 12 Copper.
- 13 Brass.
- 14 Bronze.
- 15 Aluminum.
- 16 Miscellaneous Structural Metals.
- 694.2 **STRUCTURAL METAL CONSTRUCTION.**
- 21 Fabrication.
- 211 Shop Drawings.
- 22 Framing.
- 221 Bases, Bearing Plates, Etc.
- 222 Columns and Struts.
- 223 Caps, Connections, Gussets, Etc.
- 224 Girders, Beams, Etc.
- 225 Suspenders, Tie-Rods, Chains Etc.
- 23 Preservatives.
- 231 Paint. (See 696.)
- 232 Galvanizing.
- 233 Other Methods.
- 694.3 **MISCELLANEOUS METAL.**
- 31 Fire Escapes.
- 32
- 33
- 694.4 **HEAVY METAL DOORS, SHUTTERS, ETC.**
- 41 Underwriters' Doors.
- 42 Sidewalk Doors, Floor Plates.
- 43 Shutters.
- 694.5 **ORNAMENTAL METAL.**
- 51 Stairs, Thresholds.
- 52 Enclosures, Guards, Grills, Fences, Gates, Flag Poles, Etc.
- 53 Elevator Enclosures and Cages.
- 54 Fireplace Trimming.
- 541 Andirons, Tongs, Pokers, Spark-screens, etc.
- 542 Grate Frames, Dampers, Grates, Etc.
- 543 Furniture.
- 694.6 **SOLID METAL SASH.**
- 694.7 **VAULT DOORS, SAFES, VAULTS, ETC.**
- 71 Vault Doors.
- 72 Safes.
- 73 Vaults and Bank Equipment.
- 694.8 **Tablets Memorials, Signs, Bulletins, Etc.**
- 9 Bells and Miscellaneous.
- 695 **SHEET-METAL TRADES — (Employing Metal of No. 10 gauge or less).**
- 695.0 **TOOLS, UTENSILS AND APPARATUS (used by the Sheet-Metal Trades).**
- 01 Brakes, Shears, Mallets, Hammers Etc.
- 02 Welding Machines.
- 03 Soldering Apparatus.
- 04 Plating Apparatus.
- 695.1 **SHEET-METAL MATERIALS.**
- 11 Sheet Iron.
- 111 Tin or Tin Coated Sheet Iron.
- 112 Galvanized Iron.
- 12 Sheet Copper.
- 121 Planished Copper.
- 13 Zinc Sheet.
- 14 Brass Sheet.
- 15 Bronze Sheets.
- 16 Other Sheet Metals.
- 17 Solders, Fluxes, Etc.
- 18 Hardware.
- 181 Rivets and Bolts.

- 695
 .182 Nails, Tacks and Screws.
 .183 Incidental Hardware.
 .19 Miscellaneous.
695.2 ORDINARY SHEET-METAL CONSTRUCTION.
 .21 Roofs.
 .211 Tin.
 .212 Galvanized Iron.
 .213 Copper.
 .214 Slate Shingles.
 .215 Composition.
 .216 Tile Shingles.
 .217 Cement Tile.
 .22 Cornices, Etc.
 .23 Flashing, Gutters, Valleys, Down-Spouts and Conductor Heads, Roofing, Etc.
 .24 Sky-lights, Ventilator Heads, Etc.
 .251 Furnace Work, Casings, Ducts and Stacks, Etc.
 .252 Ventilation Ducts.
 .253 Chutes, Etc.
695.3 FIRE RESISTING DOORS AND WINDOWS.
 .31 Underwriters' Tin-Clad Doors.
 .32 Underwriters' Sheet-Metal Sash.
 .33 Rolling Steel Shutters and Doors.
695.4 CEILINGS, STAMPED SHEET-METAL.
695.5 DRAWN SHEET-METAL.
 .51 Store Front Bars.
 .52 Showcase Bars, Etc.
 .53 Copper Casements.
695.6 TRIM AND DOORS OF SHEET METAL.
695.7 FURNITURE OF SHEET METAL.
695.8 UTENSILS OF SHEET METAL.
 695.9 Steel Joists, Forms, Etc.
696 BRUSH, BROOM AND SWAB- USING TRADES.
 .0 **BRUSH TRADE, TOOLS AND APPARATUS.**
 .01 Kettles, Buckets, Ladles, Swabs and Other Roofers' and Waterproofers' Tools.
 .02 Brushes, Cans, Knives, Etc.
 .03 Ladders, Scaffolding, Hoists, Etc.
 .04 Drop Cloths.
 .05 Grinders.
 .06 Spraying Machines.
696.1 BRUSH TRADE MATERIALS AND METHODS.
 .11 Roofing and Waterproofing Materials.
 .111 Felt.
 .112 Paper.
 .113 Gravel, Slag, Crushed Stone, Paving Tile, Etc.
 .114 Tar and Asphalt.
 .115 Creosote, Dips and Stains.
 .12 Painters' Materials.
 .121 Binders, (a) Oil, (b) Casein, (c) Dryers.
 .122 Pigments, (a) White Lead, (b) Red Lead, (c) Zinc, (d) Graphite, (e) Whiting, (f) Lime, (g) Other Pigments.
 .123 Colors, (a) Vegetable, (b) Mineral.
 .124 Solvents, (a) Turpentine, (b) Benzine, (c) Alcohol, (d) Other Solvents.
 .125 Wood Finishing Materials, (a) Stains, (b) Fillers, (c) Shellacs, (d) Varnishes, (e) Enamels, (f) Waxes, (g) Other Materials, (h) Lacquers.
 .126 Prepared Paints.
 .13 Water Paints.
 .131 Binder, (a) Casein, (b) Glue, (c) Other Binders.
 .132 Pigments, (a) Lime, (b) China Clay, (c) Whiting.
 .133 Colors.
 .14 Wall Papers.
 .15 Hangings and Coverings.
 .151 Fabrics.
 .152 Leather, (a) Genuine, (b) Imitation.
 .16 Hanging Hardware Poles, Etc.
 .17 Upholstery, (a) Tacks, (b) Feathers, (c) Hair, (d) Moss, (e) Ticking, (f) Cord, (g) Other Materials.
- 696
 .18 **Glazing Material.**
 .181 Glass, (a) Common Glass, (b) Plate Glass, (c) Ornamental Glass, (d) Wire-glass, (e) Prismatic Glass, (f) Colored Glass, (g) Glass Substitutes.
 .182 Putties.
 .183 Tacks.
 .184 Leading Bars, (a) Lead, (b) Zinc (c) Copper, (d) Ventilators.
 .19 **Other Materials.**
696.2 WATER-PROOFING WORK.
 .21 Brushed on Construction.
 .22 Membrane.
 .23 Calking.
696.3 COMPOSITION ROOFING WORK
 .31 Tar and Gravel Roofing.
 .32 Asphaltum Composition Roofing.
 .33 Promenade Deck Roofing.
 .34 Mastic Floors.
 .35 Composition Flashing.
696.4 PAINTING WORK.
WOOD FINISHING WORK.
GENERAL DECORATIONS.
 .61 Ordinary Water Color Tinting.
 .62 Fresco Painting, Stenciling, Etc.
 .63 Mural Decorations.
 .7 **UPHOLSTERY.**
 .8 **HANGINGS.**
 .81 Ordinary Window Shades, Awnings.
696.82 Lace Curtains.
 .83 Draperies, Decorative Screens, Etc.
 .84 Carpets, Rugs and Linoleums, Rubber Tile.
 .85 Tents.
696.9 GLAZING.
 .91 Common Glazing.
 .92 Art Glass Glazing.
- 697 **PIPE TRADES.**
 .0 **TOOLS, UTENSILS AND APPARATUS.**
 .01 Mechanic's Chest Tools, Furnaces, Etc.
 .02 Power Pipe Cutter, Benders, Dies, Etc.
 .03 Scaffolding Ladders, Etc.
697.1 MATERIALS.
 .11 Metals, (a) Wrought Iron, (b) Steel, (c) Lead, (d) Brass, (e) White Metal.
 .12 **Pipe.**
 .121 Wrought Iron, (a) Black, (b) Galvanized.
 .122 Steel, (a) Black, (b) Galvanized.
 .123 Cast Iron, Duriron.
 .124 Brass, Bronze and Copper.
 .125 White Metal.
 .126 Block Tin.
 .127 Lead Lined Iron.
 .128 Tin Lined Iron.
 .129 Tile Pipe.
 .13 **Pipe Fittings.**
 .131 Screw Connections.
 .132 Flange Connections.
 .133 Union Connections, Expansion Joints.
 .134 Caulked Connections.
 .135 Valves, (a) Shut-off, (b) Gate, (c) Disk, (d) Other Valves, (e) Air Vents.
 .136 Pipe Hangers, Supports, Etc.
 .137 Under-Ground Conduit.
 .14 **Tanks.**
 .141 Hot Water.
 .142 Cold Water, (a) Wood, (b) Metal
 .143 Oil Tanks.
 .144 Gas Tanks.
 .15 **Boiler.**
 .151 Steel Water Tube.
 .152 Steel Flue Tube.
 .153 Cast Iron Sectional.
 .16 **Stoves.**
 .161 Coal.
 .162 Gas.
 .163 Oil.

- 697
 .17 **Furnaces, Grates and Stokers for Coal and Oil.** (a) Ordinary, (b) Smokeless, (c) Dutch-oven, (d) Oil Burning, (e) Mechanical Feed.
 .18 Brass Goods.
 .19 Pottery.
- 697.2 **SEWERAGE, and Drainage** (See 692 for Masonry Sewers.)
- 697.21 **Drainage.**
 .22 Sewerage.
 .23 Sewerage and Bilge Pumps.
 .24 Sewerage Disposal Equipment.
- .3 **PLUMBING TRADE.**
- 697.31 **Plumbing Fixtures.**
 .311 Roughing-in, (a) Durham System, (b) Cast-Iron Caulked Joint System.
 .312 Water Supply, (a) Pumps, (b) Tanks, (c) Hose and Fire Apparatus, (d) Filters, (e) Sterilizers, (f) Ice Machinery, (g) Stills, Etc. (h) Domestic Heater, (i) Softeners, (j) Meters.
 .313 Garbage and Sewage Disposal, (a) Bilge Pumps, Incinerators.
 .314 Fixtures for Plumbing, (a) Floor Drains, (b) Cesspools, (c) Sinks, (d) Slop Sinks, (e) Laundry Wash Trays, (f) Lavatories, (g) Bath-tubs, (h) Showers, (i) Water Closets, (j) Urinals, (k) Bath and Toilet Room Trimmings, Paper-Holders, Towel Racks, Tumbler Holders, Soap Dishes, Etc.
 .315 Laundry Machinery.
 .316 Kitchen Machinery.
- 697.4 **GAS FITTING.**
 .41 Meters.
 .42 Fixtures.
 .43 Gas-water Heaters.
 .44 Clothes Dryers.
 .45 Gas Stoves.
- 697.5 **MECHANICAL CLEANING.**
 .6 **SPRINKLER FITTING.**
 .60 Erecting Apparatus.
 .61 Sprinkler-fitting Devices.
 .62 Storage Tanks and Towers.
 .63 Pressure Tanks, etc.
 .64 Sprinkler Equipment Pumps.
- .7 **HEATING, STEAM AND HOT WATER AND VENTILATION.**
 .71 One-Pipe Gravity.
 .72 Two-Pipe Gravity.
 .73 Vapor Two-Pipe. (Systems arranged alphabetically.)
 .74 Vacuum. (Systems arranged alphabetically.)
 .75 Radiation, (a) Direct, (b) Direct-Indirect, (c) Indirect, (d) Hangers.
 .76 Boiler Plant.
 .76-1 Steel Stacks and Breaching.
 .76-2 Tanks for Water Storage.
 .76-3 Tanks for Oil Storage.
 .76-4 Super Steam Heaters.
 .76-5 Tube Blowers.
 .76-6 Tube Cleaners.
 .76-7 Furnaces.
 .76-8 Stokers.
 .76-9 Coal Handling Equipment.
 .76-10 Ash Handling Equipment.
 .76-11 Pulverized Coal Burners and Pulverizers.
 .76-12 Oil Burners.
 .76-13 Gas Burners.
 .76-14 Draft Inducer Blowers.
 .76-15 Soot Burners.
 .76-16 Fuel Economizers.
 .76-17 Smoke Indicators.
 .76-18 Feed Water Heaters.
 .76-19 Boiler Feed Pumps.
 .76-20 Service Pumps.
 .76-21 Fire Pumps.
 .76-22 Governors for Pumps, Etc.
 .76-23 Water Softeners.
 .76-24 Lubricators.
 .76-25 Injectors for Compound.
 .76-26 Injectors for Water.
 .76-27 Feed Water Regulators.
 .76-28 Draft Regulators.
 .76-29 Flow Meters.
- 697
 .76-30 Draught Gauges.
 .76-31 CO₂ Recorders.
 .77 **Mechanical Refrigeration.**
 .771 Tanks.
 .772 Compressors.
 .773 Cooling Towers.
 .78 **Mechanical Ventilation, Air Washers and Filters.**
- 697.8 **STEAM-POWER WORK, PUMPS ETC.**
 .81 Engines.
 .82 Compression.
 .83 Pumps.
 .9 **OTHER PIPE TRADES.**
- 698 **WIRE AND CONDUIT TRADES—Electrical Work of All Kinds.**
 .0 **TOOLS, UTENSILS AND APPARATUS.**
- 698.1 **MATERIALS FOR WIRE TRADES**
 .11 Conduit.
 .111 Pipe.
 .112 Flexible Greenfield, Etc.
 .113 Moulding, (a) Wood, (b) Metal.
 .114 Tile and Porcelain.
 .115 Knob and Tube Substitute.
 .12 Insulation.
 .13 Wire, (a) Gauges, (b) Kinds.
 .14 Switchboards. **Miscellaneous Devices.**
 .141 Switchboards.
 .142 Switches, Switch Plates, Etc.
 .143 Cut-out Cabinets, Fuses, Etc.
 .144 Transformers.
 .145 Receptacle Sockets, Plugs.
 .146 Door Openers.
 .147 Batteries.
 .148 Meters, Instruments.
 .15 **Lighting Fixtures, (a) Sockets, (b) General Fittings, (c) Pendants, (d) Brackets, (e) Indirect (f) Semi Indirect, (g) Special Reflectors, (h) Signs.**
 .16 **Telephones, Speaking Tubes, Bells, Etc.**
 .161 Private Telephones.
 .162 Signal System, Alarms, Etc.
 .163 Speaking Tube.
 .164 Letter Boxes, Etc.
 .17 Motors and Generators.
 .18 Lighting Rods.
 .19 **Miscellaneous, (a) Stoves, (b) Fans, (c) Time Systems, (d) Door Operators, (e) Electric Fire-Places.**
- 698.2 **GENERAL HOUSE WIRING FOR ILLUMINATING AND MINOR POWER WORK.**
- 698.3 **TELEPHONE WORK.**
- 698.4 **ELECTRIC POWER WORK.**
- 698.5 **CENTRAL STATION WORK.**
- 698.6 **OTHER ELECTRICAL WORK.**
- 699 **MACHINERY TRADES AND MISCELLANEOUS BUILDING ITEMS—(Not Otherwise Classified).**
- 699.0 **GENERAL MATTERS PERTAINING TO THE PREPARATION AND ERECTION OF MACHINERY.**
- 699.1 **MATERIALS.**
- 699.2 **ELEVATORS.**
 .21 Passenger.
 .22 Freight.
 .23 Dumb Waiters.
- 699.3 **CONVEYING MACHINES.**
 .31 Belt Conveyors.
 .32 Chain Conveyors.
 .33 Pneumatic Tube Conveyors.
- 699.4 **FOUNDRY EQUIPMENT.**
- 699.5 **GENERAL MACHINERY.**
- 699.6 **INSULATION, PIPE COVERING, ETC.** (See 692 for Plastic Pipe Covering.)

- 699.7 **REFRIGERATORS, COOLERS AND FREEZERS.**
699.8 Kitchen, Laundry, Laboratory Equipment.
.81 Laundry Equipment.
.82 Kitchen Equipment.
.83 Laboratory Equipment.
.84 Gymnasium Equipment.
699.9 **MISCELLANEOUS TRADES NOT OTHERWISE CLASSIFIED.**
ORGANS, CHIMES.
- 700 **FINE ARTS.**
701 **PHILOSOPHY. THEORIES.**
UTILITY. AESTHETICS.
702 **COMPENDS. OUTLINES.**
703 **DICTIONARIES. CYCLOPEDIAS.**
704 **ESSAYS. LECTURES. ADDRESSES.**
705 **PERIODICALS. MAGAZINES. REVIEWS.**
706 **SOCIETIES. TRANSACTIONS. REPORTS, ETC.**
707 **EDUCATION. STUDY AND TEACHING OF ART.**
708 **ART GALLERIES AND MUSEUMS.**
709 **HISTORY OF ART IN GENERAL.**
Divided like 930-999.
710 **LANDSCAPE GARDENING.**
711 **PUBLIC PARKS.**
712 **PRIVATE GROUNDS. LAWNS.**
713 **WALKS. DRIVES. BRIDGES.**
714 **WATER. FOUNTAINS. LAKES.**
715 **TREES. HEDGES. SHRUBS.**
See also 634.9, Forestry; 582, Botany.
716 **PLANTS. FLOWERS.**
.1, Plants; .2, Flowers; .3, Conservatories; .4, Window gardens; .5, Ferneries.
717 **ARBORS. SEATS. OUTLOOKS.**
718 **MONUMENTS. MAUSOLEUMS.**
719 **CEMETERIES.** See also 393.1, Earth burial; 614.61, Public health.
722 **ANCIENT AND ORIENTAL ARCHITECTURE (Pagan).**
722.0 **PRIMITIVE.**
.04 Europe.
.05 Asia.
.06 Africa.
.07 America.
722.1 **EGYPTIAN (PERIOD DIVISION).**
.11 Ancient and Middle Empire (4000-2000 B. C.)
.12 Shepherd Kings (2000-1600 B. C.)
.13 Theban New Empire (1600-1250 B. C.)
.14 The Decadence (1150-622 B. C.)
.15 Restoration (Saite Period 663-525 B. C.)
.16 Ptolemaic Period (332-30 B. C.)
722.2 **EASTERN ASIATIC.**
.21 Chinese.
.22 Japanese.
.23 Korean.
722.3 **WESTERN ASIATIC.**
.31 Chaldean.
.311 Summerian.
.312 Akkadian.
.32 Assyrian.
.33 Persian.
.331 Ancient.
.332 Sassanian.
.34 Hittite.
.35 Phoenician.
.36 Jewish.
.37 Cypriote.
.38 Lycian.
722.4 **CENTRAL ASIATIC (INDIAN).**
.41 Hindu.
.42 Buddhist.
.43 Jaina.
.44 Davidian.
.45 Chalukyan.
.46 Burmese.
722.5 **ANCIENT AMERICAN.**
Mexico and Central America.
.511 Toltec.
.512 Aztec.
.513 Maya.
.52 South America.
.521 Inca (Peruvian and others).
722.6 **PRE-CLASSIC.**
.61 Aegean (Grecian Archipelago)
.611 Cretan or Minoan.
.612 Mycenaean.
.613 Trojan.
.62 Etruscan (Italy).
Classic.
722.7 **GREEK.**
.71 Greece.
.711 Archaic.
.712 Periclean.
.713 Hellenistic.
.72 Asia Minor.
.73 Italy.
.74 Sicily.
.75 Africa.
722.8 **ROMAN.**
.81 Italy.
.811 Etruscan influence, 493-40 B. C.
.812 Graeco-Roman influence, 212-27 B.
.813 Augustan, 27 B. C.-14 A. D.
.814 Imperial, 14 A. D.-313 A. D.
.82 Greece.
.83 Germany and Austria.
.84 France.
.85 Spain.
.86 Asia.
.87 Africa.
.88 Britain.
(Arbitrary numbers are used to designate Greek and Roman provinces).
723 **MEDIAEVAL ARCHITECTURE.**
723.1 **EARLY CHRISTIAN.**
.14 Italy.
.15 Syria.
.16 Egypt and North Africa (Coptic).
723.2 **BYZANTINE.**
.245 Italy.
.247 Russia.
.2495 Greece.
.2496 Constantinople and Vicinity.
.2497 Balkans.
723.3 **MOHAMMEDAN OR SARACENIC.**
.346 Spain (Moorish).
.353 Arabia.
.3539 Syria.
.354 India.
.355 Persia.
.356 Turkey.
.362 Egypt.
.363 North Africa (Moorish).
723.4 **ROMANESQUE.**
.441 Ireland and Scotland (Celtic).
.442 England.
.4421 Saxon.
.4422 Norman.
.443 Germanic Countries (Rhenish).
.444 France.
.4441 Provencal.
.4442 Aquitainian.
.4443 Auvergnat.
.4445 Cluniac or Burgundian.
.4446 Norman.
.445 Italy.
.4451 Lombard.
.4452 Central.
.4453 Siculo-Arabic.
.446 Spain and Portugal (Iberian Peninsula).
.447 Russia.
.448 Scandinavia.
.4481 Norway.
.4482 Sweden.
.4483 Denmark.
.449 Minor Countries.
723.5 **GOTHIC.**
.541 Ireland and Scotland.
.542 England.
.5421 Early English, 1175-1307 (13th C.)
.5422 Decorated, 1307-1377 (14th C.)
.5423 Perpendicular, 1377-1485 (15 C.)

- .5424 Tudor, 1485-1558 (Early 16th C.)
or
 { Lancet.
- .5421 { Geometrical (13th and 14th C.)
 Curvilinear.
- .5422 Rectilinear (15th C.)
- .5423 Tudor (Early 15th C.)
- .543 Germanic Countries.
- .544 France.
- .5441 Primary or Gothique (13th C.)
- .5442 Secondary or Rayonnant (14th C.)
- .5443 Tertiary or Flamboyant (15th C.)
- .545 Italy.
- .546 Spain and Portugal (Iberian Peninsula).
- .547 Russia.
- .548 Scandinavian Countries.
- .549 Minor Countries.

724 MODERN.

724.1 RENAISSANCE.

- .141 Ireland and Scotland.
- .142 England.
- .1421 Elizabethan.
- .1422 Jacobean.
- .1423 Queen Ann.
- .1424 Georgian.
- .143 Germanic Countries.
- .144 France.
- .1441 Valois Period.
 { Transition.
 Francis I.
 Advanced Renaissance.
- .1442 Bourbon.
 { Henri IV.
 Louis XIV.
 Rococo.
- .1443 Louis XVI.
- .1444 Empire.
- .145 Italy.
- .1451 Early.
- .1452 High.
- .1453 Baroque.
- .146 Iberian Peninsula (Spain and Portugal).
- .147 Russia.
- .148 Scandinavian Countries.
- .149 Minor Countries.
- .172 Spanish Colonial (Mission Mexico.)
- .1721 California.
- .1722 New Mexico.
- .1723 Arizona.
- .1724 Texas.
- .1725 Florida (Arbitrary numbers given for geographical divisions).
- .173 American Colonial (Including Georgian).
- .1731 English (1607-1720).
- .17311 New England.
- .17312 New York and Middle States.
- .17313 Maryland, Virginia, S. Carolina (Georgian Period).
- .1723 Dutch (1720-1800).
- .17321 New York.
- .17322 Pennsylvania.
- .1733 Swedish.
- .17331 Pennsylvania.
- .17332 New Jersey.
- .1734 French.
- .17341 Canada.
- .17342 Mississippi Valley.

724.2 CLASSIC REVIVAL (Roman and Greek).

- .241 Ireland and Scotland.
- .242 England.
- .243 Germany.
- .244 France.
- .245 Italy.
- .246 Spain.
- .247 Russia.
- .248 Scandinavian Peninsula.
- .249 Minor Countries.
- .271 United States (1800-1850).

The Classic Revival began with the revival of Roman, but in Germany, England and America the Greek Revival eclipsed the Roman. Many public buildings in the United States were built during the Greek Revival.

724.3 GOTHIC REVIVAL.

- .341 Ireland and Scotland, etc.
- .373 United States.
- 724.4 ROMANESQUE REVIVAL.
- .441 Ireland and Scotland, etc.
- .473 United States.
- 724.5 MODERNIST SCHOOL.
- .541 Ireland and Scotland.
- .542 England.
- .543 Germany and Austria (Secession Movement).
- .544 France (Art Nouveau).
- .545 Italy, etc.
- .573 United States (Functionalism).
- .6
- .7
- .8

724.9 CONTEMPORARY TYPES.

- .941 Ireland and Scotland, etc.
- .973 United States.
- .9731 French Renaissance Vogue.
- .9732 Neo-Romanesque Vogue.
- .9733 Neo-Classic Vogue.
- .9734 Neo-Gothic Vogue.
- .9735 Spanish Vogue.
- .9736 Italian Vogue.

DEWEY'S GEOGRAPHICAL TABLE.

These numbers are added to the various styles in order to designate geographical distribution.

- 4 EUROPE.
- 41 Ireland and Scotland.
- 42 England.
- 43 Germany.
- 431 Austria.
- 44 France.
- 45 Italy.
- 46 Spain.
- 47 Russia.
- 48 Scandinavian Countries.
- 49 Minor Countries.
- 5 ASIA.
- 6 AFRICA.
- 7 NORTH AMERICA.
- 71 Canada.
- 72 Mexico.
- 73 United States.

725 PUBLIC BUILDINGS.

- .1 Administrative. Governmental.
- .11 Capitols. Houses of Parliament.
- .12 Ministries of War, State, etc.
- .13 City and Town Halls. Bureaus.
- .14 Public Offices. City Plans.
- .14 Custom Houses. Bonded Warehouses. Excise Offices.

725

- .15 Court Houses. Record Offices.
- .16 Post Offices. General and Special.
- .17 Official Residences. Palaces of Rulers.
- .18 Barracks. Armories. Police Stations.
- .19 Engine Houses. Fire Alarm Stations.

725.2 Business and Commercial.

- .21 Stores, Wholesale and Retail.
- .22 Mixed Store, Office, and Apartment Buildings.
- .23 Office Buildings. Telegraph. Insurance. Loft.
- .24 Banks. Safe Deposit. Savings.
- .25 Exchanges. Boards of Trade.
- .26 Markets.
- .27 Cattle Markets. Stock Yards.
- .28 Abattoirs, Meat Packing Plants, etc.
- .29 Other Business Buildings.

725.3 Transportation and Storage.

- .31 Railway Passenger Stations.
- .32 Railway Freight Houses.
- .33 Railway Shops, Round Houses, Car Houses, Tanks, Stores.
- .34 Dock Buildings. Wharf Boats and Houses.
- .35 1. Warehouses; 2. Cold Storage; 3. Safe Deposit Storage.
- .36 Elevators, Grain.
- .37
- .38
- .39 Other.

725.4 Manufactories.

- .41 Textile Factories or Mills. Wool, Cotton, Silk.
- .42 Breweries. Malteries. Distilleries.
- .43 Foundries. Machine Shops. Iron and Steel Works.
- .44 Wood-working Mills. Furniture, Piano and Organ Factories.
- .45 Carriage and Car Factories.
- .46 Paper Mills.
- .47 Mills for Flour, Meal, Feed, etc.
- .48 Pottery, Glass, Terra Cotta, Brick Works.
- .49 Other Manufactories.

725.5 Hospitals and Asylums. See also

- 725.6. Reformatories.
- .51 Sick and Wounded. Eye and Ear. Incurables. Lying-in.
- .52 Insane.
- .53 Idiotic. Feeble-minded.
- .54 Blind. Deaf and Dumb.
- .55 Paupers. Almshouses.
- .56 Aged.
- .57 Children. Orphans.
- .58 Foundling.
- .59 Soldiers' Homes.

725.6 Prisons and Reformatories.

- .61 State Prisons. Penitentiaries.
- .62 Jails. Cell Houses.
- .63 Reformatories for Adults. Houses of Correction.
- .64 Reform Schools.
- .65 Inebriate Asylums.

725.7 Refreshment. Baths. Parks.

- .71 Cafés. Restaurants.
- .72 Saloons.
- .73 Baths: Warm, Medicated, Turkish, Russian.
- .74 Swimming Baths.
- .75 Buildings for Watering Places, Spas, etc.
- .76 Buildings for Parks and Streets, Public Comfort Stations.

725.8 Recreation.

- .81 Music Halls. Auditoriums.
- .82 Theatres. Opera Houses.
- .83 Halls for Lectures, Readings, etc.
- .84 Bowling Alleys. Billiard Saloons.
- .85 Gymnasiums. Turn Halls.
- .86 Skating Rinks. Bicycle Rinks.
- .87 Boat Houses. Bath Houses.
- .88 Riding Halls and Schools.
- .89 Shooting Galleries.

725.9 Other Public Buildings.

- .91 Exhibition Halls.
- .92 Temporary Halls. Tabernacles. Wigwams.
- .93 Workingmen's Clubs and Institutes.
- .94 Town Squares.
- .95 Summer Recuperating Camps.

726 ECCLESIASTICAL AND RELIGIOUS.

- .1 Temples.
- .2 Mosques.
- .3 Synagogues.
- .4 Chapels. Sunday-school Buildings.
- .5 Churches.
- .51 Frame.
- .52 Brick or Stone.
- .521 Small Audt., seating less than 600.
- .522 Large Audt., seating more than 600.
- .6 Cathedrals.
- .7 Monasteries. Convents. Abbeys.
- .8 Mortuary. Cemetery Chapels. Receiving Vaults. Tombs.
- .9 Others, Y. M. C. A., etc.

727 EDUCATIONAL AND SCIENTIFIC.

- .1 Schools.
- .11 Ward and Grammar.
- .12 High Schools.
- Study and Recitation Rooms. Not including dormitory or boarding.

727

- .2 Academies. Seminaries. Boarding Schools.
- .3 Colleges. Universities.
- .4 Professional and Technical Schools. Law, Theology, etc.
- .5 Laboratories: Physical, Chemical. See 542.1, Biological, etc. Zoological and Botanic Gardens. See also 590.7 and 580.7.
- .6 .1, Museums. .2, Herbariums. See 580.7.
- .7 .1, Art Galleries. .2, Studios.
- .8 Libraries. See 022, Library Buildings.
- .9 Other. Learned Societies, etc.

728 RESIDENCES.

- .1 Tenement Houses.
- .11 City Homes of Poor.
- .12 Country Homes of Poor.
- .13 Cités Ouvrières.

728.2 Collective Dwellings.

- .21 Flats; one family to the floor.
- .211 Small Flats less than 8 rooms.
- .212 Large Flats, 8 rooms or more.
- .22 Apartment Houses; more than one family to floor.
- .221 Five Suites or Less.
- .222 Six Suites or More.
- .2221 Elevator Service.
- .2222 No Elevator Service.

728.3 City Houses. Mansions. Palaces.

- .31 Between party-walls. Stone.
- .32 Between party-walls. Brick.
- .33 Between party-walls. Partly wood.
- .34 Semi-detached, including end houses in city blocks. Stone.
- .35 Semi-detached, including end houses in city blocks. Brick.
- .36 Semi-detached, including end houses in city blocks. Partly wood.
- .37 Detached. Stone.
- .38 Detached. Brick.
- .39 Detached. Partly wood.

728.4 Club Houses. Buildings for Secret Societies.

- .5 Hotels.
- .51 City Hotels.
- .52 Summer Resorts.
- .53 Country Inns.

728.6 Village and Country Homes.

- .61 Village Dwellings. On small lots.
- .62 Stone.
- .63 Brick.
- .64 Concrete or stucco.
- .65 Part masonry, part wood.
- .66 All wood, 1, less than 7 rooms; 2, 7-12 rm; 3, 13 rm or over.
- .67 Farm Houses.
- .68 Laborers' Cottages. 1, Frame; 2, Masonry.

728.7 Seaside and Mountain Cottages Chalets.**728.8 Country Seats.**

- .81 Castles.
- .82 Chateaux.
- .83 Manor Houses.
- .84 Villas.
- .85 Log Houses.
- .86 Bungalows.

728.9 Out-Buildings.

- .91 Porters' Lodges.
- .92 Servants' Quarters.
- .93 Kitchens and Laundries.
- .1, Stables. .2, Carriage Houses. 3 Garages.
- .95 Barns. Granaries.
- .96 Dairies.
- .97 Ice Houses.
- .98 Conservatories. Green Houses. Graperies.
- .99 Other.

- 729 ARCHITECTURAL DESIGN AND DECORATION.**
- .1 The Elevation.**
 - .11** Composition; .12, Distribution; .13, Proportion; .14, Light and Shade, .15, Perspective effect; .15, .16, .17, .18, .19.
For projection of shadows and graphics of light and shadow see 515.63 and 515.7.
 - 729.2 The Plan.**
 - .21** Elements required; .22, Distribution; .23, Proportion; .24, .25, .26, .27, .28, .29.
 - 729.3 Elementary Forms.** For construction of these forms see 721.
 - .31** Walls, Mouldings, Cornices. .32, Piers, Columns, Pilasters, Pedestals and the Orders. Colonnades. .33, Arches and Arcades. .34, Ceilings, Vaults and Domes. .35, Roof, Spires, Dormers. .36, Towers. .37, Gables and Pediments. .38, Doors and Windows, Bays, Oriels. .39, Stairs and Balustrades. See also 515.83, Stereotomy; 604.8, Building.
 - .4 Painted Decoration.**
 - 729.5 Decoration in Relief.**
 - .6 Incrustation and Veneering.**
 - .7 Mosaic and Marble.**
 - .71** Mosaic Ceilings; .72, Mosaic Walls; .73, Mosaic Floors; .74, Other Mosaic designs; .75, .76, .77, .78, .79.
 - .8 Stained Glass Design.** For technical processes see 666.1; for history see 748.
- 729.9 Architectural Accessories and Fixed Furniture.**
- .91** Altars, Pulpits, Tribunes, Dais Thrones (Ecclesiastical).
 - .92** Seating for Public Buildings.
 - .921** Benches; 2, Settees; 3, Portable Chairs and Opera Chairs.
 - .93** Domestic Chairs, Tables, Couches, Stools, Beds, etc.
 - .94** Buffets.
 - .95** Mantels, Overmantels, Andirons.
 - .96** Steel Furniture.
 - .97** Window Shades.
 - .98** .1, Organs. .2, Planos.
 - .99** Lighting Fixtures.
- 730 SCULPTURE.**
- 731 MATERIALS AND METHODS.**
- 732 ANCIENT.**
- 733 GREEK AND ROMAN.**
- 734 MEDIEVAL.**
- 735 MODERN.**
- 736 CARVING. SEALS. DIES. GEMS. CAMEOS.**
- 737 NUMISMATICS. COINS. MEDALS.**
- 738 POTTERY. PORCELAIN.**
- 739 BRONZES. BRASSES. BRIC-A-BRAC.**

INDEX TO MISCELLANEOUS AND USEFUL INFORMATION

(With Volume and Page Numbers and Relative Index)

A.

Acetylene, The Practical Use of. Vol. 2, p. 139.
Acoustics, Architectural. Vol. 6, p. 233; Vol. 10, p. 357; Vol. 20, p. 357.
Advertising, Editorial Discussion by E. S. Hall. Vol. 20, p. 21.
Advertising, Shall the I. S. A. Undertake an Advertising Campaign for the Promotion of an Appreciation of our Profession. Vol. 19, p. 23.
Air, Cooling of, in Factories. p. 581.
Air Tests, Vol. 25, p. 485.
American Lumber Standards, p. 713.
Arch, To Find Radius of. Vol. 12, p. 268.
Architect, His Duties and Responsibilities, by Henry R. Baldwin. Vol. 16, p. 24.
Architect, His Problems. Editorial Discussion by E. S. Hall. Vol. 22, p. 21.
Architect, Legal Standing of an, by Chas. N. Goodnow. Vol. 7, p. 212.
Architects of Illinois, The First State Convention of, 1914. Vol. 17, p. 211.
Architectural Act Appeal, The People ex rel. Fred Harbers. Vol. 4, p. 139; Vol. 5, p. 145.
Architectural Act, the Illinois, p. 39.
Architectural Education, "The Architecture of an Architect." Editorial Discussion by E. S. Hall. Vol. 28, p. 21.
Architectural Service, Public Education as to the Value of, Editorial by E. S. Hall. Vol. 19, p. 21.
Architecture, American Expression In, by Irving K. Pond. Vol. 13, p. 263.
Architecture, Orders of, p. 737.
Asbestos, by T. M. Younglove. Vol. 8, p. 204.
Asbestos and Its Uses. Vol. 1, p. 119.
Asphalt Floors and Roofs. Vol. 2, p. 159.
Asphaltum and Its Uses, by J. S. Jackson. Vol. 8, p. 240.
Automobiles, Space Occupied by, p. 729.

B.

Bars, Concrete Reinforcement Specifications for, p. 447-449.
Base Plates for Columns. Vol. 8, p. 219.
Bay Windows, Vol. 30, p. 734.
Beams, Small T, Functions of, Vol. 15, p. 239.
Beams, Wooden—Formula, p. 697.
Beams, Yellow Pine, Table of, Strength of, p. 521.
Bearing Plates for Columns and Beams, Vol. 13, p. 219.
Beams or Joists, Formulae for the Design of Simple Wood, Vol. 10, p. 281.
Belts for Power Transmission, Vol. 3, p. 158.
Billiard Rooms, Sizes for, p. 730.
Board Measure. Vol. 19, p. 385.
Boilers, Cast Iron, Construction, Vol. 6, p. 175.
Boiler Efficiency. Vol. 27, p. 499.
Boilers, Steam and Hot Water, p. 535.
Boilers, Smokeless, Minimum Head Room Requirements, p. 549.
Boilers, Sizes and Types of, Vol. 31, p. 561.
Bond Used in Brickwork, Vol. 22, p. 426.
Borings—Hardpan, Vol. 20, p. 285.
Bowling Alley, Sizes for, p. 729.
Breweries—Data. Vol. 7, p. 239; Vol. 13, p. 282.
Brick Construction, p. 731.
Brick, Measurement of old Brick, p. 731.
Brickwork, Weight of, p. 731.
Building Construction on New and Old Basis, by L. J. Mensch. Vol. 21, p. 257.
Building Interests, The Co-operation of, Editorial Discussion by E. S. Hall. Vol. 207, p. 23.
Building Trades, Wages, p. 131.
Buildings with Sidings—Data, p. 724.
Business System in an Architects' Office. Editorial Discussion, by E. S. Hall. Vol. 20, p. 21.

C.

Canons of Professional Ethics, p. 25.
Code of Practice, American Institute of Steel Construction, p. 451.

Civil Administrative Code of the State of Illinois, When It Effects Architects, p. 33.
Carpentry Estimates with Tables and Formula, by Emery S. Hall. Vol. 12, p. 277.
Carpentry, Joinery, Mill-work, Cabinet-work, Stair-building. Vol. 19, p. 382.
Cast Iron Rectangular Columns, Tables of Safe Loads. Vol. 3, p. 175.
Catalogues, Suggestions for Firms Issuing Same, p. 125.
Catalogues, System of Filing, p. 747.
Cement, Methods for Testing. Vol. 16, p. 203.
Cement Mortars, by S. W. Curtiss. Vol. 16, p. 296.
Cement, Standard Specifications for, by A. S. T. M. Vol. 15, p. 199.
Cement, Treatment and Finish of, Vol. 16, p. 231.
Cement and Steel, Specifications for, by Robert W. Hunt. Vol. 15, p. 191.
Cementing Materials, Vol. 13, p. 278.
Cement-Water Ratio as a Basis of Concrete Quality, by Duff A. Abrams. p. 453, Vol. XXIX.
Charges for Professional Service, p. 31.
Chimneys, Rules for Computing Proper Area to Horse Power. Vol. 3, p. 182.
Chimney Specifications, p. 557.
Cisterns—Capacities, p. 733.
Circle, Mensuration of. Vol. 23, p. 456.
Citizen's Committee to Enforce the Landis Award, Editorial. Vol. 26, p. 21.
Classification for Filing Data, Drawings, Plates, Catalogues, etc., p. 747.
Clay Tile, Hollow, Specifications, p. 469.
Coal, Space Required in Bins. Vol. 23, p. 473.
Coal Consumed During Heating Season, Chart Showing Proportion to Radiation and Length of Heating Season. Vol. 23, p. 397.
Code of Practice of the Chicago Archt's Bus. Assn. Vol. 1, p. 23; Vol. 2, p. 21.
Code of Professional Ethics, p. 25.
Colors, Contrast of. Vol. 3, p. 182.
Columns, Cast Iron—Safe Loads. Vol. 12, p. 261.
Columns, Concrete, Safe Strength, p. 698.
Concrete, Field Control of, by Col. H. C. Boyden. Vol. 28, p. 463.
Concrete Beam Design. Functions of Small T Beams, by Francis H. Wright. Vol. 14, p. 189.
Concrete Beams, Joists and Girders, Formulae for the Design of, by Ernest McCullough, Vol. 14, p. 197.
Concrete, Development in, Vol. 25, p. 381.
Concrete, The Economics of 1910, Arthur B. Hewson. Vol. 13, p. 213.
Concrete, Effect of Hydrated Lime and Other Powdered Mixtures in Concrete, Vol. 23, p. 327.
Concrete Floors, Construction of, by Col. H. C. Boyden. Vol. 26, p. 393.
Concrete Floors, Specifications for, p. 463.
Concrete Floors, Specifications for, by Wm. M. Kinney, p. 463.
Concrete Mixtures, Design of, by Prof. Duff A. Abrams. Vol. 22, p. 289.
Concrete, Strength of Reinforced, by Arthur N. Talbot. Vol. 11, p. 239.
Concrete Work. Rules of Measurement, p. 685.
Concrete in Pounds per Square Inch, Ultimate and Safe Strength of, p. 706.
Conduits for Installation of Wire and Cables, Standard Sizes. Vol. 16, p. 305; Vol. 18, p. 313.
Conveying Machinery, by S. F. Joor. Vol. 15, p. 243.
Conveying Machinery in City Buildings, by Staunton B. Peck. Vol. 13, p. 247.
Conveying of Materials, Continuous, by Staunton B. Peck. Vol. 14, p. 243.
Cooling the Air in Factories. p. 581.
Corrosion of Steel and Iron. Vol. 3, p. 174.
Craftsmanship, Deficient, Editorial by E. S. Hall. Vol. 26, p. 21.
Crosses and Symbols. Vol. 13, p. 299.
Crushed Stone, Voids in. Vol. 11, p. 259.

D.

- Damp Proofing, by Dr. Maxilian Toch. Vol. 9, p. 250.
 Davidson, Service of, Editorial. Vol. 25, p. 23.
 Design of Concrete Mixtures without Use of Abram's Tables, by Col. H. C. Boyden. Vol. 28, p. 479.
 Design for Hooped and Columns, p. 708.
 Draftsmen, The Rights of, to Make Plans for Buildings in the State of Illinois, Defined by Peter B. Wight. Vol. 16, p. 185.
 Drain Pipes—Capacities, p. 734.
 Drains and Wells, Brickwork in, p. 734.
 Drawings, General; Helps in Preparing, p. 725.
 Duty to Students. Editorial by E. S. Hall. Vol. 25, p. 21.

E.

- Editorial, p. 19.
 Electrical Inspection, Code Governing. Vol. 23, p. 283.
 Electric Wiring Plans, Symbols, p. 726.
 Elevating and Conveying Machinery. Vol. 7, p. 201; A. G. Johnson, Vol. 9, p. 247; S. F. Joor, Vol. X, p. 249.
 Ellipse and Parable, Methods of Drawing. Vol. 23, p. 466.
 Engineering Registration Law, Editorial Discussion. Vol. 17, p. 21; Vol. 20, p. 263.
 Estimates on Carpentry. Vol. 19, p. 382.
 Estimate—Data. Vol. 17, p. 294.
 Estimate—Data by Cube Method (1913). Vol. 16, p. 295.
 Estimate—Data for Ordinary Stud and Joist Construction, by E. S. Hall. Vol. 13, p. 286.
 Estimates on Painting, by E. S. Hall. Vol. 13, p. 297; Vol. 22, p. 391.
 Ethics, Professional, of the I. S. of A., p. 25.
 Excavation and Concrete Work, Rules of Measurement. Vol. 22, p. 309; Vol. 23, p. 343.
 Extra Work, Basis for Pricing, Recommended by Various Builders' Associations. Vol. 20, p. 367.
 Examination Rules for Architects (1898). Vol. 1, p. 123.
 Examination Rules for Plumbers (1899). Vol. 2, p. 137.
 Excavation, Rules for Measurement of. Vol. 26, p. 401.
 Expansion and Contraction of Iron. Vol. 9, p. 235.

F.

- Factories, Cooling the Air in, p. 581.
 Filing Catalogues, and Drawings, and Plates, p. 747.
 Finishing of Woods. W. S. Potwin. Vol. 13, p. 255.
 Fire Escapes, An Act Relating to. Vol. 7, p. 160.
 Fireproof Construction and Prevention of Corrosion, by Gen. Wm. Sovey Smith. Vol. 1, p. 143.
 Fireproofing as Applied to Residences. Vol. 1, p. 143.
 Flagstaff, The Architecture of a. Vol. 7, p. 238.
 Flat Slab Construction. Vol. 20, p. 249.
 Flat Slab Construction, Design for Reinforced Concrete with Tables. Vol. 21, p. 263.
 Flat Slab Design. Vol. 21, p. 265.
 Floor Loading. Vol. 13, p. 269.
 Fools, What, We Mortals Are. Editorial by E. S. Hall. Vol. 27, p. 21.
 Foundations—Datum. Vol. 20, p. 285.
 Foundations of Buildings. Vol. 1, p. 142.
 Freight Cars, Size of, p. 730.
 Fuel, Space Occupied by, Vol. 23, p. 473.
 Furnaces, Designs of, Vol. 25, p. 475.
 Furnace Design by Frank A. Chambers. Vol. 27, p. 539.
 Furniture, Dimensions of, p. 729.

G.

- Gas Fitters, Rules, p. 415.
 Gas Heating, p. 559.
 Gas, Natural, for Fuel. Vol. 6, p. 197.
 Gauges and Their Equivalents. Vol. 16, p. 282.
 Glass. Vol. 13, p. 277.
 Glass, Light Passing Through. Vol. 13, p. 277.
 Glass—Surface Heated by Radiation. p. 740.
 Glass and Glazing, p. 667.
 Grades, Per Mile, Water Mains—Table of, p. 733.

Gravel Roofing, Specifications for. Vol. 13, p. 291.

Gravel, Use in Concrete. Vol. 13, p. 213.

Group Responsibility, Editorial. Vol. 26, p. 21.

H.

- Hardpan Datum. Vol. 20, p. 285.
 Heating Gas, p. 559.
 Heating and Ventilating, Suggestions for Operating large High School Plant, p. 575.
 Heating and Ventilation, by Fred J. Postel. Vol. 31, p. 539.
 Heating and Ventilation by Samuel R. Lewis. p. 525.
 Heating Oil, p. 563.
 Historical and Speculative Editorial by the Committee on Publication, I. S. A.—1920. F. E. Davidson, Charles H. Hammond, George Beaumont. Vol. 23, p. 21.
 Hollow Clay Tile, Specifications, p. 469.
 Hollow Tile Fireproofing, Specification for, p. 469.
 Hooping for Core, Diameters and Hooping for Reinforced Concrete Columns, p. 708.
 Hot Water Heating, Non-Short Circuit, Two-Pipe Systems, by Homer R. Linn. p. 551.
 Heat, Transmission of, p. 735.
 High Standards for Architects. Editorial by E. S. Hall. Vol. 19, p. 21.

I.

- Illinois Society of Architects. A Discussion of the First Decade of Its History. Editorial. Vol. 20, p. 25.
 Illumination, Concerning Artificial, by T. H. Amrine. Vol. 12, p. 221.
 Impurities in Water. Vol. 15, p. 297.
 Iron Girders, The Design of (1903). Vol. 6, p. 234.

J.

- Joist—Carrying Capacity. Vol. 12, p. 260.
 Joists, Wooden—Formula. p. 697.

L.

- Labor and Capital. Editorial Discussion. Vol. 22, p. 21.
 Labor, Editorial by E. S. Hall. Vol. 24, p. 23.
 Lacquers, Composition and Uses, by W. S. Colfax, Jr. Vol. 30, p. 637.
 Law Cases of Interest to Architects. Vol. 14, p. 259.
 Law for Licensing of Architects. Vol. 3, p. 139; Vol. 5, p. 145; Vol. 21, p. 81; Vol. 26, p. 93.
 Lead—Sheet. Vol. 13 p. 287, p. 724.
 Legal Standing of an Architect. Vol. 7, p. 213.
 Legislation Concerning Architecture Practice. Editorial, E. S. Hall. Vol. 22, p. 23.
 Licensing of Architects, An Act, Vol. 1, p. 27, 1898; Vol. 2, p. 25; Vol. 3, p. 25.
 Lien Law, p. 147.
 Lime, Hydrated and Other Powdered Admixtures in Concrete. Vol. 23, p. 327.
 Limes—Cements—Plasters. Vol. 13, p. 278.
 Lightning Protection, Suggestions for, Vol. 16, p. 193; Vol. 17, p. 255.
 Light, Transmission of, Vol. 13, p. 277.
 Lighting, Artificial, Vol. 4, p. 203.
 Lighting for Billiard Rooms. Vol. 26, p. 468.
 Lighting Fixtures and Their Relation to the Home Beautiful. Vol. 24, p. 335.
 Lighting, Indirect, The Practical Side of, Vol. 16, p. 209.
 Load, Live Building Code Requirements in Various Cities, p. 467.
 Lumber—Sizes of American Lumber Standards, p. 713.
 Lumber Standardization, New (1924). Vol. 27, p. 443; Revised, p. 489.
 Lumber—Working Stresses, p. 718.

M.

- Magnesite Processes, by Edwin D. Weary. Vol. 7, p. 206.
 Mason Work, Rules of Measurement for, by Builders Association of Chicago, p. 685.
 Masonry in Pounds per Square Inch, Ultimate and Safe Strength of, p. 719.
 Masonry, Rules for Measuring, Vol. 1, p. 57; Vol. 2, p. 59, p. 685.
 Masonry, Table of Strength, p. 707.

Materials, Building, Vol. 17, p. 283.
 Materials in Construction, Weights of, p. 723.
 Materials vs. Etheral. Editorial by E. S. Hall. Vol. 24, p. 23.
 Materials, Strength of, Vol. 20, p. 283.
 Materials, Weights of, p. 723.
 Mensuration Formulae. Vol. 15, p. 276.
 Measurement of Brick, p. 731.
 Measurement of Carpentry Work. Vol. 19, p. 382.
 Measurement of Concrete. Vol. 26, p. 401.
 Measurement of Painting. Vol. 22, p. 391.
 Measurement of Plastering Rules for, p. 679.
 Measures, Tables of, Vol. 24, p. 584.
 Measuring Ventilation. Vol. 25, p. 485.
 Mechanics' Lien Law—1898. Vol. 1, p. 151; Vol. 2, p. 146; Vol. 3, p. 141; (Cases under) Vol. 4, p. 141 (Revision of 1903, amended June 16, 1913), p. 145.
 Mechanical Plants of Large Buildings, by Dankmar Adler. Vol. 1, p. 164.
 Metric System Tables. Vol. 3, p. 164, p. 721.
 Metal, A Table of the Physical Properties of, Vol. 14, p. 281.
 Metal Lath, Specification for Erecting, by the Associated Metal Lath Manufacturers. Vol. 28, p. 479.
 Metals, Except Iron and Steel. Vol. 13, p. 277.
 Metals—Physical Properties. Vol. 17, p. 283.
 Metallurgy and Assaying. Vol. 17, p. 283.
 Mile, The Length of, in Different Countries. Vol. 6, p. 235.
 Mineral Wool—Its Manufacture and Uses. Vol. 1, p. 185.
 Mirrors, Vol. 29, p. 679.
 Moral Courage, Editorial by E. S. Hall. Vol. 27, p. 23.
 Mortars, p. 731

N.

Nails for Different Work. Vol. 19, p. 385.
 National Council of Architectural Registration Boards, p. 51.
 Nomenclature of Drawings, p. 725.
 Numbering System for Streets of Chicago. Vol. 12, p. 249.

O.

Office Building Data. Vol. 2, p. 182.
 Office Hours and Holidays, p. 121.
 Office Practice, Circular of Advice by Illinois Society of Architects, Adopted April 1914. Vol. 17, p. 231.
 Office Practice for Draughtsmen, p. 121.
 Oil as a Fuel, by Fred J. Postel. Vol. 23, p. 379.
 Oil Heating, p. 563.
 Organs, Pianos, p. 729.
 Orders of Architecture, p. 729.
 Orders of Architecture and Their Application, p. 737.
 Ordinances, City of Chicago, with Index, p. 176. See Table of Contents of Previous Volumes for Old Ordinances.

P.

Paint for Cement. Vol. 10, p. 259.
 Paul System, Steam, Hot Water and Vacuum Steam Heating, 1902. Vol. 5, p. 173.
 Painting Estimates, by Emery S. Hall. Vol. 12, p. 289.
 Paint and Painting. Vol. 22, p. 391.
 Painting and Decoration, by E. S. Hall. Vol. 22, p. 391.
 Painting Structural Work. Vol. 13, p. 259.
 Painting Time an Important Factor. Vol. 12, p. 255.
 Paints, Table for Mixing, Vol. 22, p. 391.
 Paints, Wall, Sanitary, Value of, Vol. 14, p. 233.
 Planes, Sizes of, p. 729.
 Pipes, Wrought Iron, Dim. p. 733.
 Plaster, Limes and Cements Defined. Vol. 3, p. 179.
 Plastering, Standard Rules for the Measurement of, by Employing Plasterers' Assn. of Chicago, p. 673.
 Plumbing, A Discussion by Thomas J. Claffy. Vol. 26, p. 527.
 Plumbing Design in Tall Buildings, by Thomas J. Claffy. Vol. 22, p. 375.
 Plumbing, Proportioning of Soil Waste and Vent Pipes, p. 633.

Post-War Investigations. Editorial by E. S. Hall. Vol. 22, p. 25.
 Preservation of the Exterior of Wooden Buildings, by Allerton S. Cushman and Henry A. Gardner. Vol. 14, p. 223.
 Pricing Extra Work, Revised Basis for, Vol. 19, p. 354.
 Past Officers I. S. A., List of, p. 69.
 Protective Coatings for Various Structural Materials, by Henry A. Gardner. Vol. 13, p. 259.
 Protective, Preservative and Decorative Covering (Painting, Wall Hanging, Glazing, Floor Covering), p. 661.
 Pulleys, to Calculate Speed of, Vol. 13, p. 296.

R.

Radiation Load, Factor of, Safety Tables by Chicago Master Steam Fitters, p. 535.
 Radiation, Sheet Metal, Vol. 9, p. 235.
 Radius of an Arch, To Find the. Vol. 7, p. 268.
 Registration of Architects, State of Ill. Vol. 24, p. 111.
 Reinforcing Bars, Specifications for p. 447-449.
 Reinforced Concrete Columns, Safe Strength of Concentrically and Eccentrically Loaded, Formulae and Table, by Benjamin E. Winslow, p. 698.
 Reinforced Concrete, Rules of Measurement. Vol. 26, p. 401.
 Reinforced, Strength of. Vol. 13, p. 272.
 Reinforcement, Tables of. By B. E. Winslow. Vol. 13, p. 272.
 Rich and Organized Labor vs. The Great Unorganized Common Herd. Editorial by E. S. Hall. Vol. 21, p. 21.
 Robinson, Argyle E.—President. Inaugural Address. Vol. 15, p. 231.
 Roofing Composition, Specifications for. Vol. 17, p. 301.
 Roofing and Roofing Material. Vol. 12, p. 215.
 Roll of Honor I. S. A. in War Service. Vol. 21, p. 25.
 Roots, Square, p. 722.

S.

Safe Strength of Iron & Steel in pounds per square in, p. 712.
 Safe Strength of Wood, Table of. (Old.) Vol. 28, p. 688.
 Sanitary or Plumbing Ordinances, p. 585.
 Sanitation of Buildings by Leo H. Plems. p. 621.
 Schedule of Professional Charges, p. 31.
 Sewer Grades, p. 731.
 Sewer Pipes, Discharge of, p. 734.
 Sheet Metal Covering—Overlying, p. 732.
 Shingle Stains—Data. Vol. 22, p. 391.
 Shingles, Wood. Slate. Tile. Vol. 11, p. 300.
 Short Measure, In Architectural Service. Editorial E. S. Hall. Vol. 25, p. 23.
 Shysters, Editorial by E. S. Hall. Vol. 26, p. 23.
 Sidewalks and Vault Coverings. Vol. 12, p. 189.
 Simplification of Practice. Editorial by E. S. Hall. Vol. 22, p. 25.
 Slate Covering—Overlying, p. 732.
 Smoke Flues and Prevention. Vol. 11, p. 287.
 Smoke Inspection, Rules of. Vol. 12, p. 185.
 Smoke Abatement, How to Help in, by the Chicago Department of. Vol. 26, p. 491.
 Solders, Table of. Vol. 8, p. 167.
 Something for Nothing. Editorial by E. S. Hall. Vol. 19, p. 21.
 Square Roots, Tables of. Vol. 6, p. 236, 714.
 Stables, Dimensions of. Vol. 15, p. 285.
 Stains, Creosote. Vol. 22, p. 391.
 Stains, Fillers and Varnishes. By R. W. Lindsey, p. 615.
 Stairs and Risers—Table for Calculating Treads, p. 738.
 Stamping of Plans, An Opinion. Vol. 4, p. 140.
 Standard Specifications for Cement, by A. S. T. M. Vol. 16, p. 199.
 Standard Specification for Structural Steel for Building, by A. S. T. M. Vol. 16, p. 195.
 Vol. 22, p. 299.
 State Architect, Act Creating. Vol. 5, p. 133.

Steam Boilers, Proportions of, by Carpenter. Vol. 3, p. 166.
 Steam Fitters Standards, Chicago Master Assn. p. 535.
 Steam Heating, p. 525.
 Steam Mains, Sizes of. Vol. 11, p. 235, 287, 294.
 Steam and Water Heating. Vol. 2, p. 115. Vol. 3, p. 115.
 Steel Building Const. Vol. 5, p. 163. Vol. 7, p. 165.
 Steel and Cement, Specifications for, by Robert W. Hunt. Vol. 15, p. 191.
 Steel and Iron, Corrosion of. Vol. 11, p. 276.
 Steel Lumber, by Stanley Macomber. Vol. 24, p. 367.
 Steel, Modern Const. 1905, by Frederick Bauman. Vol. 8, p. 205.
 Steel Structural, by Frank J. Llewellyn. Vol. 23, p. 317. Vol. 24, p. 355.
 Steel, Structural Standard Specifications. Vol. 23, p. 333.
 Steel Structural for Buildings, Standard Specifications adopted by the American Institute of Steel Construction. p. 437.
 Steel Structural. Vol. 17, p. 201.
 Sterilization of Water, Ultra Violet Rays for, by G. R. Shaw. Vol. 28, p. 617.
 Stone Crushed, Voids, Settlement and Weight, by Ira O. Baker. Vol. 2, p. 259.
 Stone, Cut, Standard Specifications for Indiana Oolitic Limestone. p. 477.
 Stone Front, The Modern. Vol. 7, p. 202.
 Stone, Suggestions for Setting. Vol. 22, p. 425.
 Stone Voids, Settlement and Weight of, Crushed. Vol. 12, p. 193.
 Strains Defined. Vol. 14, p. 197.
 Strength of Masonry, Table of, p. 707.
 Strength of Materials. F. 283, Vol. 22, p. 283.
 Wood, Joist and Timber. Vol. 13, p. 289.
 Mechanics of Materials. Vol. 16, p. 227.
 Cast Iron and Steel Base-Plates. Vol. 13, p. 219.
 Reinforced Concrete Beams and Columns. Vol. 11, p. 239.
 Talbot Formula.
 100 lbs. Live Floor Load.
 Strength of Wood Beams, Formulae for Computing. Vol. 3, p. 178.
 Stress in Materials. Vol. 14, p. 197. Vol. 19, p. 267.
 Stresses—Working—in Structural Design, Table. Vol. 28, p. 688.
 Stresses—Working—in Pounds per Square Inch for Posts and Timbers. p. 717.
 Structural Steel for Buildings, Standard Specifications for. Vol. 14, p. 191.
 Structural Steel for Buildings, Standard Specifications for, by American Institute of Steel Construction. p. 437.
 Structural Steel Will Come Into Its Own Again, by L. J. Mensch. Vol. 22, p. 283.
 Structural Work, Painting. Vol. 8, p. 259.
 Subject Index for Filing. p. 747.
 Supply and Demand. Editorial by E. S. Hall. Vol. 25, p. 21.
 Swimming Pools, Water Supply Systems. Vol. 31, p. 645.
 Swimming Tanks, p. 730.

T.

Tables, Metric. p. 721.
 Tanks, Swimming. p. 730.
 Tanks, Swimming, Water Supply Systems. Vol. 31, p. 645.
 Telephone Service, Provisions for Wiring and Cabling of Buildings. Vol. 26, p. 373.
 Tenement House Ordinance New (1903). Vol. 6, p. 117.
 Terra Cotta, Details for Hanging. Vol. 22, p. 427.
 Terra Cotta Setting Details. Vol. 17, p. 289. Vol. 13, p. 299.
 Tile Hollow, Standard Spec. for Fire-Proofing. Vol. 5, p. 161.
 Tile, Hollow, Clay Specifications. p. 469.
 Tile—Concrete Combination Roof and Floor Construction. Vol. 30, p. 459.
 Timber, Contents in. Vol. 19, p. 385.
 Timber Measurement. Table Board Feet. Vol. 16, p. 300.

Timbers, Southern Yellow Pine, Standard Specifications for. Recommended by I. S. A. Vol. 20, p. 369. Vol. 21, p. 295. Vol. 22, p. 321.
 Timber, Standard Classification of, Illustrated. Vol. 16, p. 37.
 Timber, Structural, Specifications for. Vol. 16, p. 237.
 Tin Roofs. p. 732.
 Transmission Machinery. Vol. 11, p. 249, 271.
 Treads and Risers. p. 728.
 Treatment of Finished Concrete. Leo P. Nemzek. Vol. 16, p. 231.

U.

Union Labor Sub-Division, (1914). Editorial Discussion. Vol. 17, p. 23.

V.

Values, Building. Editorial by E. S. Hall. Vol. 24, p. 25.
 Varnish. p. 645.
 Vault Covers and Sidewalks. Vol. 12, p. 189.
 Varnish, by R. B. Johnson. Vol. 20, p. 341.
 Vehicles, Sizes of. p. 729.
 Ventilation, List of Resolutions Passed by The Chicago Commission on Ventilation, by Meyer J. Sturm. Vol. 16, p. 219.
 Ventilation, Measuring and Testing of. Vol. 25, p. 485.
 Voids in Crushed Stone. Vol. 11, p. 259.

W.

Wages in Building Trades. p. 131.
 For Old Wages, see Table of Contents, Previous Edition.
 Wall Paints, The Sanitary Value of. Vol. 14, p. 233.
 Water-Cement Ratio as a Basis of Concrete Quality, by Duff A. Abrams. p. 453, Vol. XXIX.
 Water-Expansion—Wt. and Tests. p. 722.
 Water Pressure at Different Elevation. p. 722.
 Water Supply Systems for Swimming Pools. Vol. 31, p. 645.
 Water, Pure, Tests for. p. 734.
 Weights of Building Materials. p. 723.
 Weights and Measures. Vol. 12, p. 264.
 Wind Bracing in Steel Skeleton Construction, by W. W. Wilson. Vol. 20, p. 269.
 Wind, Velocity of. Vol. 12, p. 264.
 Windows, Bays Angles of. Vol. 30, p. 734.
 Wire, Table Carrying Capacity. Vol. 2, p. 123. Vol. 4, p. 160. Vol. 6, p. 193.
 Wiring Specifications, Some Suggestions on, by F. J. Postel. Vol. 13, p. 204. Vol. 14, p. 166. Vol. 16, p. 259.
 Wood Beams Formulas for. Vol. 10, p. 281.
 Wood Finishing, by Franklin Murphy. Vol. 12, p. 253.
 Wood, Finishing of. Vol. 13, p. 255.
 Wood Mouldings, A. Comparison of. Vol. 27, p. 457.
 Wood in Pounds per Sq. Inch., Ultimate and Safe Strength of. Vol. 28, p. 688.
 Wood Structures Engineering Design. p. 714.
 Wooden Buildings, Preservation of Exterior of. Vol. 14, p. 223.
 Woods, Weight of. p. 723.

Y.

Yellow Pine Beams, Table of Strength of. Vol. 14, p. 276, 521.
 Yellow Pine Beams, Loads in Pounds. Vol. 24, p. 514.

Z.

Zoning Laws. Editorial by E. S. Hall. Vol. 26, p. 23.
 Zoning Ordinance, Amended. p. 331.
 Zoning, State Senate Bill No. 125. Vol. 23, p. 277.
 Zoning System. Editorial by E. S. Hall. Vol. 22, p. 27.

CLASSIFIED LIST OF ADVERTISERS

Advertisers are classified with a view to furnish Architects and others a ready reference list of firms engaged in the Building Business. Besides the Index to Advertisements on page 775, the number of the pages on which the Advertisements appear follows directly after each name Classified in this list. It is requested that those using it will kindly mention this publication in their correspondence.

AIR COMPRESSORS.

Am. Steam Pump Co., 53 W. Jackson 531

AIR WASHERS AND PURIFIERS.

B. & F. Heating & Ventilating Co., 228 N. La Salle St. 576
 Carbondale Machine Co., 222 W. Kinzie 64
 Gillespie Dwyer Co., 2237 W. Lake St. 604
 Haines Co., 1929 W. Lake St. 602
 Monarch Vent. Co., 1523 Kingsbury St. 612
 Western Ventilating & Eng. Co., 24 S. Clinton St. 612

ANCHORS

Dovetail Anchor Slot Co., 165 W. Wacker 140
 W-O-I Products Co., 3345 N. Lincoln St. 131

ANGLES AND CHANNELS.

(See Architectural Iron Work)

ARCHITECTURAL IRON WORK.

General Bronze Corp., 228 N. La Salle St. 462
 Guaranty Iron & Steel Co., 3847 W. Lake 452
 Halsted, Joseph Co., 31st & Spaulding 456
 Heath, J. S. Co., Waukegan, Ill. 458
 Ingeman, L. S., Ornamental Iron Co., 157 Wendell St. 460
 Tyler Co., 310 S. Michigan Inside Front Cov. 460
 Union Foundry Wks., 38 S. Dearborn St. 693
 Western Archtl. Iron Co., 3455 Elston 454
 Woodbridge Ornlt. Iron Co., 1519 Altgeld 450

ARCHITECTURAL WOODWORK.

(See Interior Finish)

ARCHITECTS' SUPPLIES.

Crofoot, Nielsen & Co., 14 N. Franklin St. 674

ART MARBLE CONTRACTORS.

Chicago Art Marble Co., 2883 Hillock St. 34

ASEBESTOS PRODUCTS.

Cent. Asbestos & Mag. Co., 214 W. Grand 580
 Ill. Fire Proof Covering Co., 216 W. Kinzie 584
 Johns-Manville, Inc., 230 N. Michigan Ave. 8
 Krez, Paul J., Co., 444 N. La Salle St. 578
 Standard Asbestos Mfg. Co., 820 W. Lake 582

ASPHALT FLOORS

Asbestos Roof. & Ins. Co., Terminal Bldg., Aurora, Ill. 68
 Fulton Asphalt Co., 228 N. La Salle St. 86
 Moore, Edw., Rfg. Co., 2729 W. Madison 60

ASPHALT SHINGLES.

(See Shingles, Fireproof)

AUTOMATIC SPRINKLERS.

(See Sprinkler Systems)

AWNINGS.

Smith Bros., 1419 Diversey Parkway 102

BANK AND OFFICE FIXTURES.

Anderson & Lind Mfg. Co., 2127 Iowa St. 506
 Brunswick-Balke-Collender Co., 623 S. Wabash Ave. 12-624
 Clemetsen Co., 3430 W. Division St. 508
 Edmunds Mfg. Co., 2016 Washburn Ave. 494
 Johnson-Schweizer Co., 1249 W. North 510
 Kasab, Joseph, 1436 W. 21st St. 502
 Matthews Bros. Mfg. Co., 333 N. Michigan 496
 Ringwald, B. R., & Sons Co., 8082 S. Chicago Ave. 504
 Schick-Johnson Co., 1737 N. Paulina St. 500
 West Woodworking Co., 309 N. Ada St. 498

BAR SPACERS AND BENDERS.

Calumet Steel Co., 33 N. La Salle St. 448
 Concrete Engineering Co., 38 S. Dearborn 416
 Inland Steel Co., 38 S. Dearborn St. 442

BARS—IRON AND STEEL.

(See Reinforcing Bars—Concrete)

BASEMENT SASH

Detroit Steel Products Co., 111 W. Wash. 422
 Federal Steel Sash Co., Waukesha, Wis. 440
 Ideal Steel Products Co., 308 N. Mich. 66
 Lupton, David, Sons Co., 333 N. Michigan 420
 Voigtmann & Co., 2543 W. 22nd St. 424
 Western Archtl. Iron Co., 3455 Elston 454

BATH TUBS.

(See Plumbing Supplies)

BEAMS AND COLUMNS—IRON AND STEEL.

(See Architectural Iron Work)

BEDS—DISAPPEARING AND WALL.

Pick-Barth, Albert, Cos., 224 W. Randolph 6

BELT AND HAND POWER ELEVATORS.

(See Elevators—Passenger and Freight)

BILLIARD ROOM SUPPLIES.

Brunswick-Balke-Collender Co., 623 S. Wabash Ave. 12-624
 Pick-Barth, Albert, Cos., 224 W. Randolph 6

BLACK BOARDS.

Welch, W. M., Mfg. Co., 1515 Sedgwick 780

BLASTING—COMPRESSED AIR—DYNAMITE

Chicago Concrete Breaking Co., 4510 Cottage Grove Ave. 130

BLOWER REGULATORS.

Davis, G. M., Reg. Co., 428 Milwaukee 613

BLUE AND BLACK PRINTING.

Crofoot, Nielsen & Co., 14 N. Franklin St. 674

BOILERS—GAS

Bryant Heater & Mfg. Co., 116 S. Mich. 560
 Mueller, L. J., Furnace Co., 413 N. State 556
 Orr & Sembower, Inc., 208 N. Clinton St. 546
 Peoples Gas, Light & Coke Co., 122 S. Michigan Ave. 414-558

BOILERS—STEAM AND HOT WATER.

Am. Radiator Co., 816 S. Michigan Ave. 540
 Bryant Heater & Mfg. Co., 218 S. Wabash 560
 Ferguson & Lange Fdry. Co., 1039 Willow 538
 Kellogg Mackay Co., 1351 W. 37th St. 524
 Kewanee Boiler Co., 1858 S. Western Ave. 526
 Mueller, L. J., Furnace Co., 413 N. State 556
 Orr & Sembower, Inc., 208 N. Clinton St. 546
 Pacific Boiler Sales Corp., 228 N. La Salle 544
 Weil-McLain Co., 641 W. Lake St. 530
 Young Radiator Co., 6 N. Michigan Ave. 542
 Winslow Boiler & Eng. Co., 844 Rush St. 564

BONDS.

Builders & Mfrs. Mutual Casualty Co., 120 S. La Salle St. 18

BOWLING ALLEYS.

(See Billiard Room Supplies)

BRASS AND BRONZE—ARCHITECTURAL.

General Bronze Corp., 228 N. La Salle St. 462
 Guaranty Iron & Steel Co., 3847 W. Lake 452
 Halsted, Joseph Co., 31st and Spaulding 456
 Heath, J. S. Co., Waukegan, Ill. 458
 Ingeman, L. S., Ornamental Iron Co., 157 Wendell St. 460
 Tyler Co., 310 S. Michigan Ave., Inside Front Cover 460
 Union Fdry. Works, 38 S. Dearborn St. 693
 Western Archtl. Iron Co., 3455 Elston Ave. 454
 Woodbridge Ornlt. Iron Co., 1519 Altgeld 450

BRICK—COMMON

Illinois Brick Co., 228 N. La Salle St. 108
 Moulding, Thomas, Brick Co., 228 N. La Salle St. 110

BRICK—FACE.

Hydraulic Press Brick Co., 228 N. La Salle St. 106
 Moulding, Thomas, Brick Co., 228 N. La Salle St. 108
 Wheeler, Burt T., Brick Co., 228 N. La Salle St. 104
 Wisconsin Lime & Cement Co., 111 W. Washington St. 122

BRICK—FIRE.

Dee, Wm. E., Co., 30 N. La Salle St. 472
 Ill. Brick Co., 228 N. La Salle St. 108
 Moulding, Thos., Brick Co., 228 N. La Salle St. 110

BRONZE WORK.

(See Brass & Bronze—Architectural)

BRIDGES AND ROOFS.

American Bridge Co., 208 S. La Salle St. 436
 Duffin Iron Co., 4837 S. Kedzie Ave. 438

BUILDERS HARDWARE.

(See Hardware—Builders)

BUILDING PAPERS.

Bird & Son, 1472 W. 76th St. 22
 Cabot, Samuel, 5000 Bloomingdale Ave. 674
 Cent. Asbestos & Mag. Co., 214 W. Grand 580
 Ill. Fire Proof Covering Co., 216 West Kinzie St. 584
 Johns-Manville, Inc., 230 N. Michigan 8
 Krez, Paul J., Co., 444 N. La Salle St. 578
 Standard Asbestos Mfg. Co., 820 W. Lake 582

BUILDING RAISERS AND MOVERS.

Friestedt, L. P., Co., 7 S. Dearborn St. 356

BULLETIN BOARDS.

Tablet & Ticket Co., 1021 W. Adams St. 26
 Welch, W. M., Mfg. Co., 1515 Sedgwick 780

CABLES—RUBBER COVERED.

Indiana Rubber & Insulated Wire Co., 140 S. Dearborn St. 366
 Mark, Clayton & Co., 111 W. Washington 374

CABINET WORK.

(See Interior Finish)

CABINETS—BATH ROOM.

Betz, Frank S., Co., 634 S. Wabash Ave. 58
 Northern Paper Mills Co., 914 Wrigley Bldg. 634

CABINETS—KITCHEN.

Betz, Frank S., Co., 634 S. Wabash Ave. 58
 Ringwald, B. R., & Sons Co., 8082 S. Chicago Ave. 504

CAFETERIA FIXTURES—METAL.

Janows & Kramer Co., 1637 Carroll Ave. 694
 Pick-Barth, Albert, Cos., 224 W. Randolph 6
 Van Range, John, Co., 1200 W. 35th St. 6

CAISSON CONSTRUCTION

(See Foundations)

CANOPIES—CANVAS.

Smith Bros., 1419 Diversey Parkway 102

CANOPIES—IRON & BRONZE.

(See Brass & Bronze, Architectural)

CANS—ASH & GARBAGE

Diener, Geo. W., Mfg. Co., 400 N. Monticello Ave. 92

CARPENTER CONTRACTORS.

Adams, Wm., Co., 1530 N. Damen Ave. 338
 Anderson, A. & E., Co., 228 N. La Salle 348
 Anderson, Edward A., Co., 566 Center St., Winnetka 330
 Ardmore Constr. Co., 105 W. Monroe St. 332
 Barnard, H. B., 140 S. Dearborn St. 284
 Black, Robert, Co., 122 S. Michigan Ave. 318
 Brundage, Avery, Co., 110 S. Dearborn 298
 Bulley & Andrews, 2040 W. Harrison St. 324
 Cadenhead Co., 8 E. Huron St. 340
 Dahl-Stedman Co., 11 S. La Salle St. 290
 Dilks Constr. Co., 160 N. La Salle St. 294

Duffy-Noonan Constr. Co., 168 W. Adams 322
 Duval Constr. Co., 180 W. Washington 334
 Ericsson, Henry, Co., 228 N. La Salle 286
 Ericsson, John E., Co., 123 W. Madison St. 328
 French, J. B., Co., 30 N. Michigan Ave. 326
 Friestedt, H. F., Co., 431 N. Michigan 342
 Gage, Thos. G., Co., 64 W. Randolph St. 336
 Great Lakes Constr. Co., 333 N. Michigan 344
 Griffiths, John, & Son Co., 228 N. La Salle 276
 Hanson Brothers Co., 127 N. Dearborn St. 350
 Janisch, H., & Co., 1801 Winona St. 320
 Kralh Constr. Co., 350 N. Clark St. 308
 Lanquist Constr. Co., 1100 N. Clark St. 282
 Larson, Algot B., Co., 3833 W. Lake St. 300
 Lynch, W. J., Co., 844 Rush St. 346
 Maas-Manson Co., 241 E. Ohio St. 306
 McKeown Bros. Co., 112 W. Adams St. 302
 McLennan Constr. Co., 307 N. Michigan 316
 Herlihy Mid-Continent Co., 228 N. La Salle St. 352

Moses, C. A., Constr. Co., 168 W. Adams 288
 Nielsen, S. N., Co., 3059 Augusta St. 304
 Simmons, J. L., Co., 4010 W. Madison St. 312
 Snyder, J. W., Co., 307 N. Michigan Ave. 278
 Sollitt, Ralph, & Sons Constr. Co., 228 N. La Salle St. 310
 Strandberg, E. P., Co., 232 E. Erie St. 296
 Thompson-Starrett Co., 104 S. Michigan 280
 Thomson, Geo. & Son Co., 30 N. La Salle 292
 Turner Constr. Co., 228 N. La Salle St. 314
 Wilson, R. F., & Co., 1851 Elston Ave. 274

CARPETS AND RUGS.

Hardwick & McGee Co., 29 E. Madison 118
 Pick-Barth, Albert, Cos., 224 W. Randolph 6
 Richardson, O. W., & Co., 125 S. Wabash 38

CAST STONE.

Benedict Stone Inc., 105 W. Adams St. 32
 Plastic Products Co., 1991 Port Washington Road, Milwaukee, Wis. 138

CASTINGS—GENERAL.

(See Foundries)

CEMENT.

Universal Portland Cement Co., 208 S. La Salle St. 40
 Wisconsin Lime & Cement Co., 111 W. Washington St. 122

CEMENT—MANUFACTURERS.

Universal Portland Cement Co., 208 S. La Salle St. 40

CEMENT TESTING.

Hunt, Robert W., Co., 175 W. Jackson 24

CHANDELIERS.

(See Electric Fixtures)

CHEMISTS.

Hunt, Robert W., Co., 175 W. Jackson 24

CHIMNEY CONSTRUCTION.

Cont. Chimney Constr. Co., 127 N. Dearborn St. 472

CLOSET SEATS.

Brunswick-Balke-Collender Co., 623 S. Wabash Ave. 12-624
 Rundell-Spence Mfg. Co., Milwaukee, Wis. 622

CLOTHES DRYERS.

Am. Laundry Mch. Co., 633 S. Wabash 46
 Gen. Laundry Mch. Co., 822 W. Washington St. 48

COAL AND ASH HANDLING MACHINERY.

Link-Belt Co., 330 W. Pershing Road 152
 Olson, Samuel, & Co., 1238 N. Kostner Av. 14
 Weller Mfg. Co., 1820 N. Kostner Ave. 154

COAL AND GAS RANGES—COMBINATION.

Cribben & Sexton Co., 700 N. Sacramento 416
 Crown Stove Works, 4631 W. 12th Place Cicero, Ill. 418
 Peoples Gas, Light & Coke Co., 122 S. Michigan 414-558

COLD STORAGE DOORS.

Matot, D. A., 1538 Montana St. 82

COLD STORAGE INSULATION.	
Carbondale Machine Co., 222 W. Illinois	64
Masonite Corp., 111 W. Washington St.	126
Matot, D. A., 1538 Montana St.	82
COLUMNS—IRON.	
Lally Column Co., 4001 Wentworth Ave.	52
COLUMNS—WOOD.	
Hartmann-Sanders Co., 2155 Elston Ave.	695
CONCRETE BREAKING	
Chicago Concrete Breaking Co., 4510 Cottage Grove	130
CONCRETE FORMS.	
Concrete Engineering Co., 38 S. Dearborn	446
CONCRETE-FILLED METAL COLUMNS	
Lally Column Co., 4001 Wentworth Ave.	52
CONCRETE NAILS	
W-O-I Products Co., 3345 N. Lincoln St.	134
CONCRETE REINFORCING BARS—STEEL. (See Reinforcing Bars—Concrete)	
CONDUITS—UNDERGROUND—STEAM PIPES.	
Stannard Power Equipment Co., 53 W. Jackson	534
CONTRACTORS' BONDS.	
Builders & Mfrs. Mutual Casualty Co., 120 S. La Salle St.	18
CONVEYORS—BELT & GRAVITY.	
Link-Belt Co., 300 W. Pershing Road	152
Olson, Samuel, & Co., 1238 N. Kostner	14
Otis Elevator Co., 600 W. Jackson Blvd.	144
Weller Mfg. Co., 1820 N. Kostner Ave.	154
COOLING SYSTEMS FOR BUILDINGS.	
Gillespie-Dwyer Co., 2237 W. Lake St.	604
Haines Co., 1929 W. Lake St.	602
Mehring & Hanson Co., 162 N. Clinton St.	608
Monarch Vent. Co., 1523 Kingsbury St.	612
Western Ventilating & Eng. Co., 24 S. Clinton St.	612
CURB GUARDS.	
Calumet Steel Co., 33 N. La Salle St.	448
Inland Steel Co., 38 S. Dearborn St.	442
CUT STONE—ARTIFICIAL.	
Benedict Stone, Inc., 105 W. Adams St.	32
Plastic Products Co., 1991 Port Washington Road, Milwaukee, Wis.	138
DAMP RESISTING COMPOUNDS.	
Central Ironite Waterproofing Co., 111 W. Washington St.	80
Insulite Co., 111 W. Washington St.	124
Johns-Manville, Inc., 18th and Michigan	8
DEADENING MATERIAL.	
Bird & Son, 1472 W. 76th St.	22
Cabot, Samuel, 5000 Bloomingdale Ave.	674
Flax-Li-Num Insulating Co., 228 N. La Salle St.	128
Johns-Manville, Inc., 230 N. Michigan	8
Wood Conversion Co., 360 N. Michigan	76
DECORATORS—INTERIOR.	
Nelson, W. P., & Co., 153 W. Ohio St.	656
Noelle, J. B., & Co., 868 N. Franklin St.	660
Olson, Alfred Co., 4651 N. Clark St.	658
DERRICKS.	
Sasgen Derrick Co., 3101 W. Grand Ave.	156
DESKS.	
Clemensen Co., 3130 W. Division St.	508
Welch, W. M., Mfg. Co., 1515 Sedgwick	780
DIRECTORIES.	
Tablet & Ticket Co., 1021 W. Adams St.	26
Welch, W. M., Mfg. Co., 1515 Sedgwick	780
DOOR BEDS.	
Prek-Earth, Albert, Cos., 224 W. Randolph	6
DOOR CLOSERS.	
Norton Door Closer Co., 2900 N. Western	88
Norton Laster Co., 466 W. Superior St.	94
Swanson, Jas., & Son, 164 W. Clinton St.	90
DOOR STOPS.	
Grand Specialties Co., 3101 W. Grand Av.	156
DOORS—CROSS HORIZONTAL FOLDING.	
Variety Fire Door Co., 2958 Carroll Ave.	692
DOORS—METAL.	
Dahlstrom Metallic Door Co., 19 S. La Salle St.	142
Tyler Co., 310 S. Michigan, Inside Front Cover	
Variety Fire Door Co., 2958 Carroll Ave.	692
Voigtmann & Co., 2543 W. 22nd St.	424
DOORS—WOOD.	
Anderson & Lind Mfg. Co., 2127 Iowa St.	506
Chicago Sash, Door & Blind Mfg. Co., 1249 W. North Ave.	510
Curtis Door & Sash Co., 1414 S. Western	512
Ringwald, B. R., & Sons Co., 8082 So. Chicago Ave.	504
DRAFTING ROOM FURNITURE AND SUPPLIES.	
Welch, W. M., Mfg. Co., 1515 Sedgwick	780
DRAIN BASE.	
Stanward Power Equipment Co., 53 W. Jackson	534
Wade Iron Sanitary Mfg. Co., 1717 S. Canal St.	628
DRAINAGE. (See Plumbing, Gas Fitting, Sewage)	
DRAPERIES. (See Decorators—Interior)	
DRAWING MATERIALS.	
Crofoot, Nielsen & Co., 14 N. Franklin	674
DRILLING.	
Chicago Concrete Breaking Co., 4510 Cottage Grove	130
DRINKING FOUNTAINS.	
Carbondale Machine Co., 222 W. Kinzie	64
Rundell-Spence Mfg. Co., Milwaukee, Wis.	622
DRY ROOMS.	
Am. Laundry Mch. Co., 633 S. Wabash	46
Gen. Laundry Mch. Co., 822 W. Washington St.	48
DUMB WAITERS.	
Matot, D. A., 1538 Montana St.	82
Otis Elevator Co., 600 W. Jackson Blvd.	144
DYNAMOS.	
Commonwealth Edison Co., 72 W. Adams	384
ELECTRIC ELEVATORS. (See Elevators—Passenger and Freight)	
ELECTRIC FIXTURES.	
Beardslee Chandelier Mfg. Co., 216 S. Jefferson	380
Benjamin Elec. Mfg. Co., 111 S. Canal St.	358
Commonwealth Edison Co., 72 W. Adams	384
Everson, C. G., & Co., 215 N. Dearborn	378
ELECTRIC FUSES.	
Benjamin Elec. Mfg. Co., 111 S. Canal St.	358
Economy Fuse & Mfg. Co., 2711 Greenview Ave.	382-383
Johns-Manville, Inc., 230 N. Michigan	8
Trumbull Electric Mfg. Co., 2001 W. Pershing Road	364
ELECTRIC SUPPLIES—MANUFACTURERS.	
Appleton Electric Co., 1721 Wellington	360
Benjamin Elec. Mfg. Co., 111 S. Canal St.	358
Bryant Electric Co., 844 W. Adams St.	370
Electric Apparatus Co., 702 N. Halsted	368
Hubbell, Harvey, Inc., 318 W. Washington St.	378
Trumbull Electric Mfg. Co., 2001 W. Pershing Road	364
ELECTRIC MOTORS.	
Commonwealth Edison Co., 72 W. Adams	384
ELECTRIC REFRIGERATION. (See Refrigeration—Electric)	
ELECTRIC WIRE—INSULATED.	
Indiana Rubber & Insulated Wire Co., 110 S. Dearborn St.	366
Mark, Clayton & Co., 111 W. Washington	374

ELECTRIC WIRING DEVICES.

Bryant Electric Co., 844 W. Adams St. 370
 Hubbell, Harvey, Inc., 318 W. Washin. 372

ELECTRICAL CONTRACTORS.

Berthold, Gus, Electric Co., 551 W. Monroe 376
 Commonwealth Edison Co., 72 W. Adams 384
 Comstock, L. K., & Co., 333 N. Michigan 396
 Dearborn Electrical Constr. Co., 205 W. Wacker Drive 392
 Fuchs Electric Co., 129 S. La Salle St. 390
 Hatfield Electric Co., 100 N. La Salle St. 398
 Lamont, L. H., & Co., 9 S. Clinton St. 394
 Newgard, Henry, & Co., 549 W. Wash. 386
 Pierce Electric Co., 215 W. Randolph St. 388
 Post Electric Co., 228 N. La Salle St. 400
 Sample, Robt. J., Co., 113 W. Austin Ave. 402

ELEVATING AND CONVEYING MCHY.

(See Conveyors—Belt and Gravity)

ELEVATOR ENCLOSURES

Dahlstrom Metallic Door Co., 19 S. La Salle St. 142
 Tyler Co., 310 S. Michigan Ave., Inside Front Cover.
 Union Fdry. Works, 38 S. Dearborn St. 693

ELEVATOR FIRE DOORS.

Dahlstrom Metallic Door Co., 19 S. La Salle St. 142
 Tyler Co., 310 S. Michigan Ave., Inside Front Cover.
 Union Fdry. Works, 38 S. Dearborn St. 693

ELEVATOR REPAIRS.

Otis Elevator Co., 600 W. Jackson Blvd. 144

ELEVATORS—BUILDING MATERIAL.

Sasgen Derrick Co., 3101 W. Grand Ave. 156

ELEVATORS—PASSENGER AND FREIGHT

Elevator Co. of Am., 190 N. State St. 146
 Otis Elevator Co., 600 W. Jackson Blvd. 144
 Pitt Engineering Co., 120 W. Kinzie St. 148
 Westinghouse Elevator Co., 1500 N. Branch 150

ENAMELS.

Du Pont, E. I. de Nemours & Co., 2100 Elston Ave. 646
 Pratt & Lambert, Inc., 320 W. 26th St. 644

ENGINEERS—CONSULTING.

Hunt, Robt. W., Co., 175 W. Jackson Blvd. 24

ESCALATORS.

Otis Elevator Co., 600 W. Jackson Blvd. 144

EXCAVATING.

Herlihy Mid-Continent Co., 228 N. La Salle St. 352
 Newman, W. J., Co., 21 N. Curtis St. 354

EXHAUST FANS.

Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive 362

EXITS.

(See Fire Escapes.)

EXIT SIGNS—ELECTRIC.

Robinson, T. L., & Co., 1458 W. Kinzie St. 672
 Tablet & Ticket Co., 1021 W. Adams St. 26

EXTINGUISHERS—FIRE.

Diener, Geo. W., Mfg. Co., 400 N. Monticello Ave. 92

FAUCETS.

Chicago Faucet Co., 2712 N. Crawford 626
 Crane Co., 836 S. Michigan Ave. 532-618

FENCE—FACTORY.

Cyclone Fence Co., Waukegan, Ill. 62

FENCE POSTS—CAST IRON.

Cyclone Fence Co., Waukegan, Ill. 62

FILTERS.

Everson, C. G., & Co., 215 N. Dearborn 378

FIRE ALARM SYSTEMS.

Am. Automatic Fire Protection Co., 9 S. Clinton St. 610
 Diener, Geo. W., Mfg. Co., 400 N. Monticello Ave. 92

FIRE DOORS.

Guaranty Iron & Steel Co., 3847 W. Lake 452
 Variety Fire Door Co., 2958 Carroll Ave. 692

FIRE ESCAPES.

Halsted, Joseph Co., 31st and Spaulding 456
 Johnson, Chas., & Son, Fire Escape Co., 859 N. Spaulding Ave. 444
 Union Fdry. Works, 38 S. Dearborn St. 693

FIRE EXTINGUISHERS.

(See Sprinkler Systems)

FIRE WINDOWS.

Detroit Steel Prod. Co., 111 W. Wash. 422
 Federal Steel Sash Co., Waukesha, Wis. 440
 Lupton, David, Sons Co., 333 N. Michigan 420
 Voigtmann & Co., 2543 W. 22nd St. 424

FIREPLACES.

Architectural Decorating Co., 1600 S. Jefferson 56
 Colonial Fireplace Co., 4626 W. Roosevelt 28
 Interior Tiling Co., 21 E. Van Buren St. 432
 Plastic Products Co., 1991 Port Washington Rd., Milwaukee, Wis. 138
 Updike & Co., 612 N. Michigan Ave. 428

FIREPROOF PARTITIONS.

Ill. Fireproof Constr. Co., 228 N. La Salle 470
 Interstate Fire Proofing Co., 844 Rush St. 470
 Maas-Manson Co., 241 E. Ohio St. 306
 Nat. Fire Proofing Co., 228 N. La Salle St. 468
 Simplex Steel Prod. Co., 1146 Roscoe St. 678
 U. S. Gypsum Co., 300 W. Adams St. 42

FIREPROOF SHUTTERS AND DOORS.

(See Iron Doors and Shutters)

FIREPROOFING.

Ill. Fireproof Constr. Co., 228 N. La Salle 470
 Interstate Fire Proofing Co., 844 Rush St. 470
 Maas-Manson Co., 241 E. Ohio St. 306
 Nat. Fire Proofing Co., 228 N. La Salle St. 468
 U. S. Gypsum Co., 300 W. Adams St. 42

FLOOR DRAINS.

Wade Iron Sanitary Mfg. Co., 1717 S. Canal St. 628

FLOOR FILL

Aerocrete Western Corp., 612 N. Michigan 132

FLOOR PLATES—WROUGHT IRON.

Union Fdry. Works, 38 S. Dearborn St. 693

FLOORING—HARDWOOD.

Bishop Lumber Co., 2315 Elston Ave. 488
 Bond, Ralph A. Co., 720 N. Michigan Ave. 518
 Cellized Oak Flooring, Inc., 108 E. Ohio 522
 Hines, Ed., Lumber Co., 2431 S. Lincoln 490
 North, H. J., Inc., 35 W. Kinzie St. 516
 Rittenhouse & Embree Co., 3500 S. Racine 492
 Robbins Flooring Co., Rhinelander, Wis. 514

FLOORS—ACID PROOF.

Asbestos Roofing & Insulation Co., Terminal Bldg., Aurora, Ill. 68
 Fulton Asphalt Co., 228 N. La Salle St. 86
 Moore, Edw., Roofing Co., 2729 W. Madison St. 60

FLOORS—ART MARBLE.

Chicago Art Marble Co., 2883 Hillock 34
 Kalteux, Nic., 220 S. State St. 694

FLOORS—ASPHALT.

Asbestos Roofing & Insulation Co., Terminal Bldg., Aurora, Ill. 68
 Fulton Asphalt Co., 228 N. La Salle St. 86
 Moore, Edw., Roof'g Co., 2729 W. Madison 60

FLOORS—COMPOSITION.

Asbestos Roofing & Insulation Co., Terminal Bldg., Aurora, Ill. 68
 Chicago Flexotile Floor Co., 111 W. Wash. 114
 Kalman Floor Co., 400 N. Michigan Ave. 112
 Moulding, Thos., Brick Co., 228 N. La Salle 110
 Muller, Franklin R., Inc., Waukegan, Ill. 1

FLOORS—MOSAIC.

Am. Encaustic Tiling Co., 332 S. Michigan 426
 Hawkinson, John S., Co., 80 E. Jackson 432
 Interior Tiling Co., 21 E. Van Buren St. 432
 Updike & Co., 612 N. Michigan Ave. 428
 Western Mosaic & Terrazzo Co., 4214 Ogden Ave. 430

FLOORS—RUBBER TILE.

Salisbury, H. W. & Co., Inc., 308 W. Madison St.	41
Richardson, O. W. & Co., 125 S. Wabash	38
Wright Rubber Products Co., Racine, Wis.	4

FLUE LININGS.

Am. Terra Cotta & Ceramic Co., 228 N. La Salle St.	36
Dee, William E., Co., 30 N. La Salle St.	472
Ill. Fireproof Constr. Co., 228 N. La Salle	470
Interstate Fireproofing Co., 844 Rush St.	470
Midland Terra Cotta Co., 105 W. Monroe	30
Nat. Fire Proofing Co., 228 N. La Salle	468
Northwestern Terra Cotta Co., 2525 Clybourn Ave.	10

FORGINGS.

American Bridge Co., 208 S. La Salle St.	436
Inland Steel Co., 38 S. Dearborn St.	442

FORMS—CONCRETE

Concrete Eng. Co., 1926 S. 52nd Ave.	446
--------------------------------------	-----

FOUNDATIONS.

Herlihy Mid-Continent Co., 228 N. La Salle St.	352
--	-----

FOUNDRIES.

Union Foundry Works, 38 S. Dearborn	693
-------------------------------------	-----

FURNACE—GAS FIRED.

Mueller, L. J., Furnace Co., 413 N. State	556
---	-----

FURNITURE—SCHOOL.

Welch, W. M., Mfg. Co., 1515 Sedgwick St.	780
---	-----

FURNITURE, SPECIAL DESIGN.

Nelson, W. P., Co., 153 W. Ohio St.	656
-------------------------------------	-----

FUSE RENEWABLE.

Benjamin Elec. Mfg. Co., 111 S. Canal St.	358
Economy Fuse & Mfg. Co., 2711 Greenview Ave.	382-383
Trumbull Electric Mfg. Co., 2001 W. Pershing Road	364
Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362

GARAGE DOOR STOPS.

Grand Specialties Co., 3101 W. Grand	156
--------------------------------------	-----

GARAGE DRAINS.

Wade Iron Sanitary Mfg. Co., 1717 S. Canal St.	628
--	-----

GARBAGE CREMATORIES.

Connole, M. M., Co., 123 Madison St.	572
Kerner Incinerator Co., 612 N. Michigan	528
Kewanee Boiler Co., 1858 S. Western Ave.	526
Stearns Incinerator Co., 123 W. Madison St., and Syracuse, N. Y.	572
Weil-McLain Co., 641 W. Lake St.	530

GAS BOILERS.

Bryant Heater & Mfg. Co., 116 S. Mich.	560
Mueller, L. J., Furnace Co., 413 N. State	556
Peoples Gas, Light & Coke Co., 122 S. Michigan Ave.	414-558

GAS FITTING.

(See Plumbing, Gas Fitting, and Sewerage)

GAS FIXTURES.

Everson, C. G. & Co., 215 N. Dearborn St.	378
Peoples Gas, Light & Coke Co., 122 S. Michigan Ave.	414-558

GAS LOGS AND GAS GRATES.

Architectural Decorating Co., 1600 S. Jefferson	56
Colonial Fireplace Co., 4626 W. Roosevelt	28
Peoples Gas, Light & Coke Co., 122 S. Michigan Ave.	414-558

GAS RADIATORS.

(See Radiators—Gas)

GAS RANGES AND STOVES.

Cribben & Sexton Co., 700 N. Sacramento	416
Crown Stove Wks., 1631 W. 12th Place, Cicero, Ill.	418
Janows & Kramer Co., 1637 Carroll Ave.	694
Peoples Gas, Light & Coke Co., 122 S. Michigan Ave.	414-558
Pick-Barth, Albert, Cos., 224 W. Randolph	6
Van Range, John, Co., 1200 W. 25th St.	6

GENERAL CONTRACTORS.

Adams, William, Co., 1530 N. Damen Ave.	338
Anderson, A. & E. Co., 228 N. La Salle	348
Anderson, Edward A., Co., 566 Center St., Winnetka, Ill.	330
Ardmore Constr. Co., 105 W. Monroe St.	332
Barnard, H. B., 140 N. Dearborn St.	284
Black, Robert, Co., 122 S. Michigan Ave.	318
Brundage, Avery, Co., 110 S. Dearborn	298
Bulley & Andrews, 2040 W. Harrison St.	324
Cadenhead Co., 8 E. Huron St.	340
Dahl-Stedman Co., 11 S. La Salle St.	290
Dilks Constr. Co., 160 N. La Salle St.	294
Duffy-Noonan Constr. Co., 168 W. Adams	322
Duval Constr. Co., 180 W. Washington	334
Ericsson, Henry, Co., 228 N. La Salle St.	286
Ericsson, John E., Co., 123 W. Madison St.	328
French, J. B., Co., 30 N. Michigan Ave.	326
Friedstedt, A. F., Co., 431 N. Michigan Ave.	342
Gage, Thos. G., Co., 64 W. Randolph St.	336
Great Lakes Constr. Co., 28 E. Jackson	344
Griffiths, John, & Son Co., 228 N. La Salle	276
Hanson Brothers Co., 127 N. Dearborn St.	350
Herlihy Mid-Continent Co., 228 N. La Salle St.	352
Jani'sch, H. & Co., 1801 Winona St.	320
Krahl Constr. Co., 350 N. Clark St.	308
Lanquist Constr. Co., 1100 N. Clark St.	282
Larson, Algot B., Co., 3833 W. Lake St.	300
Lynch, W. J., Co., 844 Rush St.	346
Maas-Manson Co., 241 E. Ohio St.	306
McKeown Bros. Co., 112 W. Adams St.	302
McLennan Constr. Co., 307 N. Michigan	316
Moses, C. A., Constr. Co., 168 W. Adams	288
Nielsen, S. N., Co., 3059 Augusta St.	304
Simmons, J. L., Co., 4010 W. Madison St.	312
Snyder, J. W., Co., 307 N. Michigan Ave.	278
Sollitt, Ralph, & Sons Constr. Co., 228 N. La Salle St.	310
Strandberg, E. P., Co., 232 E. Erie St.	296
Thompson-Starrett Co., 104 S. Michigan	280
Thomson, Geo., & Son Co., 30 N. La Salle	292
Turner Constr. Co., 228 N. La Salle St.	314
Wilson, R. F., & Co., 1851 Elston Ave.	274

GLASS—PRISMATIC.

Am. 3-Way Luxfer Prism Co., 1313 S. 55th St., Cicero, Ill.	676-677
Richards and Kelly Mfg. Co., 309 W. 23rd	670

GLASS—PLATE—SETTING.

Brasco Mfg. Co., Harvey, Ill.	98
Zouri Drawn Metals Co., Chgo. Hgts., Ill.	668

GLASS—ORNAMENTAL.

Robinson, T. L., & Co., 1458 W. Kinzie St.	672
Western Sandblast Mfg. Co., 1458 W. Kinzie St.	672

GLASS—STRUCTURAL.

Sanitary Constr. Co., 1476 W. Austin Ave.	632
Vitrolite Co., 120 S. La Salle St.	666

GRAIN ELEVATOR MACHINERY.

Link-Belt Co., 300 W. Pershing Road	152
Olson, Samuel, & Co., 1238 N. Kostner	14
Weller Mfg. Co., 1820 N. Kostner Ave.	154

GRATES AND FIREPLACES.

Architectural Decorating Co., 1600 S. Jefferson	56
Colonial Fireplace Co., 4626 W. Roosevelt	28
Udike & Co., 230 E. Ohio St.	428
Plastic Products Co., 1991 Port Washington St., Milwaukee, Wis.	138

GRAVEL.

Dee, William E., Co., 30 N. La Salle St.	472
--	-----

GREASE TRAPS.

Wade Iron Sanitary Mfg. Co., 1717 S. Canal St.	628
--	-----

GREENHOUSES

Foley Greenhouse Mfg. Co., Forest Pk., Ill.	54
---	----

GRILLE WORK—METAL.

(See Iron Work—Ornamental)

GYPSUM PRODUCTS.

C. S. Gypsum Co., 300 W. Adams St.	42
------------------------------------	----

HARDWARE—BUILDERS.

Ill. Hardware Co., 230 N. Michigan Ave.	96
Swanson, Jas., & Son, 164 N. Clinton St.	90

HARDWOOD FLOORING.

(See Flooring—Hardwood)

HEADSTONES.

Blake, Chas. G., Co., 1000 E. 67th St. 158

HEAT REGULATION.

Davis, G. M., Reg. Co., 422 Milwaukee 613
 Johnson Service Co., 1355 Washington 611
 Marsh, Jas. P. & Co., 2037 Southport Ave. 548
 O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis. 570
 Powers Regulator Co., 2796 Greenview 630

HEATERS—OIL.

Lammert & Mann Co., 1751 Walnut St. 568
 Ray Burner Corp., 720 Cass St. 562
 Winslow Boiler & Eng. Co., 844 Rush St. 564

HEATING APPARATUS.

Am. Radiator Co., 816 S. Michigan Ave. 540
 Bryant Heater & Mfg. Co., 116 S. Michigan Ave. 560
 Clow, Jas. B., & Sons, 201 N. Talman Ave. 614
 Dwyer Equipment Co., 4534 W. North 552
 Ferguson & Lange Fdry. Co., 1039 Willow 538
 Gillespie-Dwyer Co., 2237 W. Lake St. 604
 Kellogg-Mackay Co., 1351 W. 37th St. 524
 Kewanee Boiler Co., 1858 S. Western Ave. 526
 Lammert & Mann Co., 1751 Walnut St. 568
 Marsh, Jas. P. & Co., 2037 Southport Ave. 548
 Mueller, L. J., Furnace Co., 413 N. State 556
 Orr & Sombower, Inc., 208 N. Clinton St. 546
 Pacific Boiler Sales Corp., 228 N. La Salle 544
 Ray Burner Corp., 720 Cass St. 562
 Trane Co., 844 Rush St. 566
 Weil-McLain Co., 641 W. Lake St. 530
 Young Radiator Co., 6 N. Michigan Ave. 542
 Winslow Boiler & Eng. Co., 844 Rush St. 564

HEATING CONTRACTORS—HOT WATER—STEAM—VACUUM—VAPOR.

Baldwin, J. P., Co., 1304 W. Washington 606
 Claffey, E. J., Co., 10 W. Illinois St. 590
 Ensign Eng. Co., 35 E. Wacker Drive 600
 Evans, Chas. E., & Co., 7 S. May St. 598
 Glennon-Bielke Co., 3045 Irving Pk. Blvd. 607
 Gordon, Robert, Inc., 22 W. Austin Ave. 588
 Ill. Engr. Co., W. 21st and S. Racine 554
 Johnson, C. W., Inc., 211 N. Desplaines 586
 Kilander, A., & Co., 126 S. Clinton St. 606
 Kohlbray-Howlett Co., 63 W. Ontario St. 594
 Lees, William, 548 Washington Blvd. 609
 Mehring & Hanson Co., 162 N. Clinton 608
 Nilson Bros., 3222 N. Halsted St. 608
 Noble & Thumm, 1065 Addison St. 611
 Phillips-Getschow Co., 421 N. State St. 607
 Pope, William A., 26 N. Jefferson St. 609
 Reger, H. P., & Co., 1501 E. 72nd Place 596
 Thumm, W. E., Inc., 1130 Cornelia Ave. 592
 Watson, W. W., 708 Carpenter St. 610

HEATING—INDUSTRIAL.

Dwyer Equipment Co., 4534 W. North 552
 Marsh, Jas. P. & Co., 2037 Southport Ave. 548
 Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive 362
 Young Radiator Co., 6 N. Michigan Ave. 542

HECTOGRAPH PRINTS.

Crofoot, Nielsen & Co., 14 N. Franklin 674

HOISTING MACHINERY.

Sasgen Derrick Co., 3103 W. Grand Ave. 156

HOLLOW TILE.

Dee, William E., Co., 30 N. La Salle St. 472
 Ill. Fireproof Constr. Co., 228 N. La Salle 470
 Interstate Fire Proofing Co., 844 Rush St. 470
 Nat. Fire Proofing Co., 228 N. La Salle St. 468

HOSPITAL EQUIPMENT.

Betz, Frank S., Co., 634 S. Wabash Ave. 58
 Welch, W. M., Mfg. Co., 1515 Sedgwick 780

HOT BLAST HEATING.

B & F Heating & Ventilating Co., 228 N. La Salle St. 576
 Gillespie-Dwyer Co., 2237 W. Lake St. 604
 Haines Co., 1929 W. Lake St. 602
 Johnson, C. W., Inc., 211 N. Desplaines St. 586
 Monarch Vent. Co., 1523 Kingsbury St. 612
 Western Ventilating & Engineering Co., 24 S. Clinton St. 612

HOT WATER HEATERS.

Bryant Heater & Mfg. Co., 116 S. Michigan Ave. 560
 Crane Co., 836 S. Michigan Ave. 532-618
 Kewanee Boiler Co., 1858 S. Western Ave. 526
 Mueller, L. J., Furnace Co., 413 N. State 556

HOTEL SUPPLIES.

Janows & Kramer Co., 1637 Carroll Ave. 694
 Pick-Barth, Albert, Cos., 224 W. Randolph 6

HOUSE MOVERS AND RAISERS.

Friestedt, L. P., Co., 7 S. Dearborn St. 356

HUMIDIFIERS.

Diener, Geo. W., Mfg. Co., 400 N. Monticello Ave. 92
 Trico, Inc., 1734 N. Kolmar Ave. 78

HYDRANTS.

Chicago Faucet Co., 2712 N. Crawford 626
 Crane Co., 836 S. Michigan Ave. 532-618

HYDRAULIC ELEVATORS.

(See Elevators, Passenger and Freight)

ICE CONVEYING MACHINERY.

Link-Belt Co., 300 W. Pershing Road 152
 Olson, Samuel, & Co., 1238 N. Kostner 14
 Weller Mfg. Co., 1820 N. Kostner Ave. 154

ICE MACHINERY

Carbondale Machine Co., 222 W. Kinzie St. 64

INCINERATORS—GARBAGE.

Connole, M. M., Co., 123 W. Madison St. 572
 Kerner Incinerator Co., 612 N. Michigan 528
 Kewanee Boiler Co., 1858 S. Western Ave. 526
 Stearns Incinerator Co., 123 W. Madison St., and Syracuse, N. Y. 572
 Weil-McLain Co., 641 W. Lake St. 530

INDIANA LESTONE.

Fluck Cut Stone Co., 1229 E. 74th St. 482
 Indiana Limestone Corp., 435 N. Michigan Ave. 476-478-480

INDIANA LESTONE PRESSURE RELIEVING JOINTS.

Cowing Pressure Relieving Joint Co., 160 N. Wells St. 484

INDUSTRIAL HEATING.

Dwyer Equipment Co., 4534 W. North 552
 Marsh, Jas. P. & Co., 2037 Southport Ave. 548
 Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive 362
 Young Radiator Co., 6 N. Michigan Ave. 542

INDUSTRIAL LIGHTING.

Beardslee Chandelier Mfg. Co., 216 S. Jefferson St. 380
 Benjamin Elec. Mfg. Co., 111 S. Canal St. 358
 Commonwealth Edison Co., 72 W. Adams 384
 Everson, C. G., & Co., 215 N. Dearborn 378
 Robinson, T. L., & Co., 1458 W. Kinzie St. 672

INSPECTORS.

Hunt, Robert W., Co., 175 W. Jackson 24

INSULATION.

Asbestos Roofing & Insulating Co., Terminal Bldg., Aurora, Ill. 68
 Bird & Son, 1472 W. 76th St. 22
 Cent. Asbestos & Mag. Co., 214 W. Grand 580
 Flax-Li-Num Insulating Co., 228 N. La Salle St. 128
 Ill. Fire Proof Covering Co., 216 W. Kinzie St. 584
 Insulate Co., 111 W. Washington St. 124
 Johns-Manville, Inc., 18th and Michigan 8
 Krez, Paul J., Co., 444 N. La Salle St. 578
 Masonite Corp., 111 W. Washington St. 126
 Matot, D. A., 1538 Montana St. 82
 Standard Asbestos Mfg. Co., 820 W. Lake 582
 Wood Conversion Co., 360 N. Michigan 76

INSULATING MATERIALS.

Bird & Son, 1472 W. 76th St. 22
 Flax-Li-Num Insulating Co., 228 N. La Salle St. 128
 Johns-Manville, Inc., 230 N. Michigan 8
 Masonite Corp., 111 W. Washington St. 126
 Westinghouse Electric & Mfg. Co., 20 W. Wacker Drive 362
 Wood Conversion Co., 360 N. Michigan 76

INTERIOR FINISH.

Anderson & Lind Mfg. Co., 2127 Iowa St.	506
Clemetsen Co., 5430 W. Division	508
Chicago Sash, Door & Blind Mfg. Co., 1249 W. North Ave.	510
Edmunds Mfg. Co., 2016 Washburne Ave.	514
Johnson-Schwartz Co., 1149 W. North	510
Kasab, Joseph, 1136 W. 21st St.	502
Matthews Bros. Mfg. Co., 333 N. Michigan Ave.	496
Ringwald, B. R., & Sons Co., 8082 So. Chicago Ave.	504
Schick-Johnson Co., 1737 N. Paulina	500
West Woodworking Co., 300 N. Ada St.	498

IRON DOORS AND SHUTTERS.

General Bronze Corp., 228 N. La Salle St.	462
Guaranty Iron & Steel Co., 3847 W. Lake	452
Halsted, Joseph Co., 31st and Spaulding	456
Heath, J. S., Co., Waukegan, Ill.	458
Ingeman L. S., Ornamental Iron Co., 157 Wendell St.	460
Tyler Co., 310 S. Michigan, Inside Front Cover	
Variety Fire Door Co., 2958 Carroll Ave.	692
Western Archl. Iron Co., 3455 Elston Ave.	454
Woodbridge Ornamental Iron Co., 1519 Altgeld St.	450

IRON STAIRS—RAILINGS AND FENCES.

(See Architectural Iron and Bronze)

IRON STORE FRONTS.

(See Architectural Iron Work)

IRON WORK—ORNAMENTAL.

General Bronze Corp., 228 N. La Salle St.	462
Guaranty Iron & Steel Co., 3847 W. Lake	452
Halsted, Joseph, Co., 31st and Spaulding	456
Ingeman, L. S., Ornamental Iron Co., 157 Wendell St.	460
Tyler Co., 310 S. Michigan Inside Front Cover	
Union Foundry Wks., 38 S. Dearborn St.	693
Western Archl. Iron Co., 3455 Elston Ave.	454
Woodbridge Ornamental Iron Co., 1519 Altgeld St.	450

IRON WORK—STRUCTURAL.

(See Structural Iron and Steel)

IRONING MACHINES (ELECTRIC).

Am. Laundry Mch. Co., 633 S. Wabash	46
Commonwealth Edison Co., 72 W. Adams	384
General Laundry Mch. Co., 822 W. Washington	48

JOINTS PRESSURE RELIEVING (FOR STONE).

Cowing Pressure Relieving Joint Co., 160 N. Wells St.	484
---	-----

KALSOMINE.

Moore, Benj., & Co., 415 N. Green St.	652
---------------------------------------	-----

KITCHENS—STEEL.

Betz, Frank S., Co., 64 S. Wabash Ave.	58
Janows & Kramer Co., 1637 Carroll Ave.	694
Pick, Albert, & Co., 224 W. Randolph St.	6

LABORATORY EQUIPMENT.

Welch, W. M., Mfg. Co., 1515 Sedgwick	780
---------------------------------------	-----

LABORATORY—TESTING.

Hunt, Robert W., Co., 175 W. Jackson	24
--------------------------------------	----

LAMPS.

Beardslee Chandler Mfg. Co., 216 S. Jefferson St.	380
Everson, C. G., & Co., 113 N. Dearborn	378
Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362

LAMPS, EXTERIOR—IRON AND BRONZE.

General Bronze Corp., 228 N. La Salle St.	462
Halsted, Joseph, Co., 31st and Spaulding	456
Heath, J. S., Co., Waukegan, Ill.	458
Ingeman, L. S., Ornamental Iron Co., 157 Wendell St.	460
Western Archl. Iron Co., 3455 Elston Ave.	454
Woodbridge Ornamental Iron Co., 1519 Altgeld St.	450

LATH.

Ellis Lumber Co., 2313 Lincoln Ave.	488
Hines, Ed., Lumber Co., 1131 S. Lincoln	490
Rittenhouse & Lumber Co., 3500 S. Racine	492

LATH—METAL AND WIRE.

Concrete Engineering Co., 38 S. Dearborn	446
Voss, Frederick, 522 W. Monroe St.	693

LATH—METAL HANGER

"The-To" Insert Co., 574 Layton Blvd., Milwaukee, Wis.	126
--	-----

LAUNDRY MACHINERY.

Am. Laundry Mch. Co., 633 S. Wabash	46
General Laundry Mch. Co., 822 W. Washington	48

LAUNDRY TRAYS AND KITCHEN SINKS.

Am. Laundry Mch. Co., 633 S. Wabash	46
Clow, Jas. B., & Sons, 201 N. Talman Ave.	614
Crane Co., 836 S. Michigan Ave.	532-618
General Laundry Mch. Co., 822 W. Washington	48
Kellogg-Mackay Co., 1351 W. 37th St.	524
Standard Sanitary Mfg. Co., 900 S. Michigan Ave.	614
Weil-McLain Co., 641 W. Lake St.	530

LIABILITY INSURANCE.

Builders & Mfrs. Mutual Casualty Co., 120 S. La Salle St.	18
---	----

LIBRARY EQUIPMENT.

Welch, W. M., Mfg. Co., 1515 Sedgwick	780
---------------------------------------	-----

LIGHTING FIXTURES.

(See Electric Fixtures)

LIME.

Marblehead Lime Co., 160 N. La Salle St.	120
Wisconsin Lime & Cement Co., 111 W. Washington St.	122

LIME PRODUCTS.

Marblehead Lime Co., 160 N. La Salle St.	120
--	-----

LIMESTONE

(See Indiana Limestone)

LIMESTONE—PRESSURE RELIEVING JOINTS.

Cowing Pressure Relieving Joint Co., 160 N. Wells St.	484
---	-----

LINOLEUM

Pick-Barth, Albert, Cos., 224 W. Randolph	6
Richardson, O. W., & Co., 125 N. Wabash	38

LUMBER.

Bishop Lumber Co., 2315 Lincoln Ave.	488
Hines, Ed., Lumber Co., 2431 S. Lincoln	490
Rittenhouse & Embree Co., 3500 S. Racine	492

MACHINISTS.

Gordon, Robert, Inc., 22 W. Austin Ave.	588
---	-----

MAGNESIA PRODUCTS.

Cent. Asbestos & Mag. Co., 214 W. Grand	580
Ill. Fire Proof Covering Co., 216 W. Kinzie	584

Johns-Manville, Inc., 230 N. Michigan	8
Krez, Paul J., Co., 444 N. La Salle St.	578
Standard Asbestos Mfg. Co., 820 W. Lake	582

MAIL CHUTES.

Cutler Mail Chute Co., Rochester, N. Y.	692
---	-----

MANHOLE COVERS.

Dee, William E., Co., 30 N. La Salle St.	472
Wade Iron Sanitary Mfg. Co., 1717 S. Canal St.	628

MANTELS.

Architectural Decorating Co., 1600 S. Jefferson	56
Colonial Fireplace Co., 4626 W. Roosevelt	28
Plastic Products Co., 1991 Port Washington Road, Milwaukee, Wis.	178
Updike & Co., 612 N. Michigan Ave.	428

MAPLE FLOORING.

Robbins Flooring Co., Rhinelander, Wis.	514
---	-----

MARBLE.

Enterprise Marble Co., 1141 Newport Ave.	84
Peering Marble Co., 2891 Hillock Ave.	2
Tompkins-Kiel Marble Co., 400 N. Michigan Ave.	20

MARBLE—ART

Chicago Art Marble Co., 2883 Hillock Ave.	34
---	----

MASON CONTRACTORS.

Adams, Wm., Co., 1530 N. Damen Ave.	338
Anderson, A. & E. Co., 228 N. La Salle	348
Anderson, Edward A., Co., 566 Center St., Winnetka	330
Ardmore Constr. Co., 105 W. Monroe St.	332
Barnard, H. B., Co., 140 S. Dearborn St.	284
Black, Robert, Co., 122 S. Michigan Ave.	318
Brundage, Avery, Co., 110 S. Dearborn	298
Bulley & Andrews, 2040 W. Harrison St.	324
Cadenhead Co., 8 E. Huron St.	340
Dahl-Stedman Co., 11 S. La Salle St.	290
Dilks Constr. Co., 160 N. La Salle St.	294
Duffy-Noonan Constr. Co., 168 W. Adams	322
Duval Constr. Co., 180 W. Washington	334
Ericsson, Henry, Co., 228 N. La Salle St.	286
Ericsson, John E., Co., 123 W. Madison St.	328
French, J. B., Co., 30 N. Michigan Ave.	326
Friedstedt, H. F., Co., 431 N. Michigan	342
Gage, Thos. G., Co., 64 W. Randolph St.	336
Great Lakes Constr. Co., 333 N. Michigan	344
Griffiths, John, & Son, 228 N. La Salle St.	276
Hanson Bros. Co., 127 N. Dearborn St.	350
Herlihy Mid-Continent, 228 N. La Salle	352
Janisch, H., & Co., 1801 Winona St.	320
Krahl Constr. Co., 350 N. Clark St.	308
Lanquist Constr. Co., 1100 N. Clark St.	282
Larson, Algot B., Co., 3833 W. Lake St.	300
Lynch, W. J., Co., 844 Rush St.	346
Maas-Manson Co., 241 E. Ohio St.	306
McLennan Constr. Co., 307 N. Michigan	316
Moses, C. A., Constr. Co., 168 W. Adams	288
Nielsen, S. N., Co., 3059 Augusta St.	304
Simmons, J. L., Co., 4010 W. Madison St.	312
Sollitt, Ralph, & Sons Constr. Co., 228 N. La Salle St.	310
Snyder, J. W., Co., 307 N. Michigan Ave.	278
Strandberg, E. P., Co., 232 E. Erie St.	296
Thompson-Starrett Co., 104 S. Michigan	280
Thomson, Geo., & Son Co., 30 N. La Salle	292
Turner Constr. Co., 228 N. La Salle St.	314
Wilson, R. F., & Co., 1851 Elston Ave.	274

MATERIAL HOISTS.

Sasgen Derrick Co., 3103 W. Grand Ave.	156
--	-----

MAUSOLEUMS

Blake, Charles G., Co., 1000 E. 67th St.	158
--	-----

METAL CEILINGS & WALLS.

Friedley-Voshardt Co., 733 S. Halsted St.	464
---	-----

METAL LATH.

Concrete Eng. Co., 38 S. Dearborn St.	446
Voss, Frederick, 522 W. Monroe St.	693

METAL LATH HANGER.

"Tie-To", Insert Co., 874 Layton Blvd., Milwaukee, Wis.	136
---	-----

METAL, SASH & FRAMES.

Biegler, Louis, Co., 165 N. Curtis St.	695
Dahlstrom Metallic Door Co., 19 S. La Salle St.	142
Detroit Steel Prod. Co., 111 W. Washgtn.	422
Federal Steel Sash Co., Waukesha, Wis.	440
Ideal Steel Products Co., 308 N. Michigan	66
Lupton, David, Sons Co., 333 N. Michigan	420
Tyler Co., 310 S. Michigan Ave., Inside Front Cover.	
Voigtmann & Co., 2543 W. 22nd St.	424

MILL WORK.

Anderson & Lind Mfg. Co., 2127 Iowa St.	506
Chicago Sash, Door & Blind Mfg. Co., 1249 W. North Ave.	510
Curtis Door & Sash Co., 1414 S. Western	512
Edmunds Mfg. Co., 2016 Washburne Ave.	494
Johnson-Schweizer Co., 1249 W. North	510
Matthews Bros. Mfg. Co., 333 N. Michigan	496
Ringwald, B. R. & Sons, Co., 8082 So. Chicago Ave.	504
West Woodworking Co., 300 N. Ada St.	498

MONUMENTS.

Blake, Charles G., Co., 1000 E. 67th St.	158
--	-----

MORTGAGE LOANS.

(See Loans—Building)

MOSAICS.

Am. Encaustic Tiling Co., 322 S. Mich.	426
Hawkinson, John S., Co., 80 E. Jackson	432
Interior Tiling Co., 21 E. Van Buren St.	432
Updike & Co., 612 N. Michigan Ave.	428
Western Mosaic & Terrazzo Co., 4214 Ogden Ave.	430

MURAL DECORATIONS.

Nelson, W. P., Co., 153 W. Ohio St.	656
W-O-I Products Co., 3345 N. Lincoln St.	134

NEEDLE BATH WATER MIXERS.

Powers Regulator Co., 2796 Greenview	630
--------------------------------------	-----

NON-SLIP ART MARBLE FOR STEPS, TREADS, FLOORS & RAMPS.

Chicago Art Marble Co., 2883 Hillock Ave.	34
---	----

OFFICE FIXTURES.

(See Interior Finish)

OIL BURNERS.

Lammert & Mann Co., 1751 Walnut St.	568
Ray Burner Corp., 720 Cass St.	562
Orr & Sembower, Inc., 208 N. Clinton St.	546
Winslow Boiler & Eng. Co., 844 Rush St.	564

OUTLET BOXES.

Appleton Electric Co., 1721 Wellington	360
Bryant Electric Co., 844 W. Adams St.	370
Electric Apparatus Co., 702 N. Halsted	368
Trumbull Electric Mfg. Co., 2001 W. Pershing Road	364

PACKAGE CONVEYORS

Link-Belt Co., 300 W. Pershing Road	152
Olson, Samuel, & Co., 1238 N. Kostner	14
Weller Mfg. Co., 1820 N. Kostner Ave.	154

PAINT—DAMP RESISTING.

Central Ironite Waterproofing Co., 111 W. Washington St.	80
--	----

PAINT—FIREPROOF.

Johns-Manville Corp., 230 N. Michigan	8
Moore, Benj., & Co., 415 N. Green St.	652
U. S. Gutta Percha Paint Co., 651 W. Washington St.	654

PAINT—GRAPHITE.

Detroit Graphite Co., 53 W. Jackson	650
Moore, Benj., & Co., 415 N. Green St.	652
U. S. Gutta Percha Paint Co., 651 W. Washington St.	654

PAINT—IRON.

Detroit Graphite Co., 53 W. Jackson	650
Moore, Benj., & Co., 415 N. Green St.	652

PAINT—MIXED.

Detroit Graphite Co., 53 W. Jackson Blvd.	650
Hockaday Co., 1823 Carroll Ave.	648
Moore, Benj., & Co., 415 N. Green St.	652
U. S. Gutta Percha Paint Co., 651 W. Washington	654

PAINTING CONTRACTORS.

Nelson, W. P., Co., 153 W. Ohio St.	656
Noelle, J. B., Co., 868 N. Franklin St.	660
Olson, Alfred, Co., 4651 N. Clark St.	658

PANELEBOARDS.

Benjamin Electric Mfg. Co., 111 S. Canal	358
Berthold, Gus, Electric Co., 551 W. Monroe St.	376
Electric Apparatus Co., 702 N. Halsted	368
Trumbull Electric Mfg. Co., 2001 W. Pershing Road	364
Westinghouse Electric Mfg. Co., 20 W. Wacker Dr.	362

PARTITION BLOCKS.

Aerocrete Western Corp., 612 N. Michigan	132
--	-----

PARTITION & CEILING CONSTRUCTION.

Simplex Steel Prod. Co., 1146 Roscoe St.	678
--	-----

PARTITION AND FLOOR DEADING.

Bird & Son, 1472 W. 76th St.	22
Flax-Li-Num Co., 228 N. La Salle St.	128
Simplex Steel Prod. Co., 1146 Roscoe St.	678
Wood Conversion Co., 360 N. Michigan	76

PARTITION TILE.

(See Hollow Tile)

PARTITIONS—TOILET

Chicago Art Marble Co., 2883 Hillock Ave.	34
Enterprise Marble Co., 1111 Southport	84
Peerling Marble Co., 2891 Hillock Ave.	2
Sanitary Constr. Co., 1476 W. Austin	632
Tompkins-Kiel Marble Co., 400 N. Mich.	20
Vitrolite Co., 120 S. La Salle St.	666

PILING—WOOD.

Lake Superior Piling Co., 2464 S. Loomis	691
--	-----

PIPE AND BOILER COVERING.

Cent. Asbestos & Mag. Co., 214 W. Grand	580
Ill. Fire Proof Covering Co., 216 W. Kinzie	584
Johns-Manville, Inc., 230 N. Michigan	8
Krez, Paul J., Co., 444 N. La Salle St.	578
Standard Asbestos Mfg. Co., 816 W. Lake	582

PLASTER.

U. S. Gypsum Co., 300 W. Adams St.	42
------------------------------------	----

PLASTER BASE.

Insulite Co., 111 W. Washington St.	124
Simplex Steel Prod. Co., 1146 Roscoe St.	678

PLASTER BOARD.

Bird & Son, 1472 W. 76th St.	22
Insulite Co., 111 W. Washington St.	124
U. S. Gypsum Co., 300 W. Adams St.	42

PLASTER—ORNAMENTAL.

Architectural Decorating, 1600 S. Jefferson	56
Plastic Products Co., 1991 Port Washington Road, Milwaukee, Wis.	138

PLASTERING CONTRACTORS.

Balatchet, Wm., Co., 228 N. La Salle St.	688
Brown, James J., Plastering Co., 176 W. Adams St.	684
Burson Bros., 118 E. 30th St.	686
Goss & Guise, 228 N. La Salle St.	690
Kalteux & Brown Co., 25 N. Dearborn St.	690
Lennox-Haldeman Co., 208 S. La Salle St.	689
McNulty Bros. Co., 1028 W. Van Buren	682
Parent, N. J., Co., 5 S. Wabash Ave.	689
Sutton Plaster Co., 25 E. Jackson Blvd.	688
Zander-Reum Co., 7 S. Dearborn St.	680

PLATE GLASS SETTING

Brasco Mfg. Co., Harvey, Ill.	98
Zouri Drawn Met. Co., Chicago Hgts., Ill.	668

PLUMBING SUPPLIES.

Clow, James B., & Sons, 201 N. Talman	614
Crane Co., 836 S. Michigan Ave.	532-618
Imperial Brass Mfg. Co., 1232 W. Harrison	620
Kellogg-Mackay Co., 1351 W. 37th St.	524
Standard Sanitary Mfg. Co., 900 S. Mich.	616
Weil-McLain Co., 641 W. Lake St.	530

PLUMBING, GASFITTING AND SEWER-AGE.

Corboy, M. J., Co., 405 N. Desplaines St.	638
Evans, Chas. E., & Co., 7 S. May St.	598
Kohlbray-Howlett Co., 63 W. Ontario St.	594
Murphy Plumbing Co., 1720 S. Michigan	640
Nilson Bros., 3222 N. Halsted St.	608
Noble & Thumm, 1065 Addison St.	611
Reger, H. F., & Co., 1501 E. 72nd Pl.	596
Watson, W. W., 708 Carpenter St.	610
Young, E. J., & Co., 307 N. Michigan Ave.	642

PNEUMATIC TUBE SYSTEM.

Olson, Samuel, & Co., 1238 N. Kostner	14
---------------------------------------	----

POST CAPS.

Cyclone Fence Co., Waukegan, Ill.	62
-----------------------------------	----

POWER EQUIPMENT.

Standard Power Equipment Co., 53 W. Jackson Blvd.	524
---	-----

PROJECTORS.

Pyle National Co., 1334 N. Kostner Ave.	696
---	-----

PRESSURE RELIEVING JOINTS (FOR STONE).

Cowing Pressure Relieving Joint Co., 160 N. Wells St.	484
---	-----

PUMPS—AUTOMATIC AND HYDRAULIC.

Chicago Pump Co., 2336 Wolfram St.	613
Trane Co., 844 Rush St.	566
Wade Iron Sanitary Mfg. Co., 551 Fulton, 1717 S. Canal St.	628

PUMPS—ELECTRIC.

Chicago Pump Co., 2336 Wolfram St.	613
Trane Co., 844 Rush St.	566
Wade Iron Sanitary Mfg. Co., 551 Fulton, 1717 S. Canal St.	628
Westinghouse Electric & Mfg. Co., 20 W. Wacker Drive	362

PUMPS—STEAM.

Chicago Pump Co., 2336 Wolfram St.	613
Trane Co., 844 Rush St.	566

RADIATORS.

Am. Radiator Co., 816 S. Michigan Ave.	540
Kewanee Boiler Co., 1858 S. Western Ave.	526
McQuay Radiator Corp., 35 E. Wacker Dr.	574
Young Radiator Co., 6 N. Michigan Ave.	542

RADIATORS—GAS.

Clow, James B., & Sons, 201 N. Talman	614
Peoples Gas Light & Coke Co., 122 S. Michigan Ave.	414-558

RADIATOR COVERS.

Betz, Frank S., Co., 634 S. Wabash Ave.	58
McQuay Radiator Corp., 35 E. Wacker Dr.	574
Trico, Inc., 1734 N. Kolmar Ave.	78

RADIATOR VALVES—PACKLESS.

Am. Radiator Co., 816 S. Michigan Ave.	540
Crane Co., 836 S. Michigan Ave.	532-618
Dunham, C. A., Co., 450 E. Ohio St.	536
Ill. Eng. Co., W. 21st and S. Racine Ave.	554
McQuay Radiator Corp., 35 E. Wacker Dr.	574
Milwaukee Valve Co., Milwaukee, Wis.	550
Trane Co., 844 Rush St.	566

RANGES—ELECTRIC.

Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362
Commonwealth Edison Co., 72 W. Adams	384

REFLECTORS—DIRECT & INDIRECT.

Beardslee Chandelier Mfg. Co., 216 S. Jefferson Ave.	380
Commonwealth Edison Co., 72 W. Adams	384
Everson, C. G., & Co., 215 N. Dearborn St.	378
Pyle National Co., 1334 N. Kostner Ave.	696
Robinson, T. L., & Co., 1458 W. Kinzie St.	672
Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362

REFRIGERATION.

B. & F. Heating & Vent. Co., 228 N. La Salle St.	576
Thumm, W. F., Inc., 1130 Cornelia Ave.	592

REFRIGERATING MACHINERY.

Carbondale Machine Co., 222 W. Kinzie	64
---------------------------------------	----

REFRIGERATORS.

Brunswick-Balke-Collender Co., 623 S. Wabash Ave.	12-624
Commonwealth Edison Co., 72 W. Adams	408
Janows & Kramer Co., 1637 Carroll Ave.	694
Kelvinator, Chicago, Co., 217 E. Illinois	412
Matot, D. A., 158 Montana St.	82
Pick-Barth, Albert, Companies, 224 W. Randolph St.	6

REFRIGERATORS—ELECTRIC.

Carbondale Machine Co., 222 W. Illinois	64
Commonwealth Edison Co., 72 W. Adams	408
Cooper, R. Jr., Inc., 120 S. La Salle St.	406
Kelvinator, Chicago Co., 217 E. Illinois	412
Stover Co., 151 N. Michigan Ave.	410
Utility Appliance Corp., 215 N. Michigan	404

REFRIGERATORS—GAS.

Peoples Gas Light & Coke Co., 122 S. Michigan Ave.	414-558
--	---------

REGULATORS—DAMPER.

Davis, G. M., Reg. Co., 422 Milwaukee	613
Dunham, C. A., Co., 450 E. Ohio St.	536
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Trane Co., 844 Rush St.	566

**REGULATORS—HEAT—STEAM—AIR—
WATER.**

Davis, G. M., Reg. Co., 422 Milwaukee	613
Dunham, C. A., Co., 450 E. Ohio St.	536
Johnson Service Co., 1355 Washington	611
Milwaukee Valve Co., Milwaukee, Wis.	550
Powers Regulator Co., 2796 Greenview	630
Trane Co., 844 Rush St.	566

REINFORCING BARS.

American Bridge Co., 208 S. La Salle St.	436
Calumet Steel Co., 33 N. La Salle St.	448
Concrete Engrng. Co., 38 S. Dearborn St.	446
Cyclone Fence Co., Waukegan, Ill.	62
Inland Steel Co., 38 S. Dearborn St.	442

RESTAURANT SUPPLIES.

Pick-Barth, Albert, Cos., 224 W. Randolph	6
---	---

ROOF DRAINS.

Wade Iron Sanitary Mfg. Co., 1717 S. Canal St.	628
--	-----

ROOF INSULATION

Flax-Li-Num Insulating Co., 228 N. La Salle St.	128
Insulite Co., 111 W. Washington St.	124
Wood Conversion Co., 360 N. Michigan	76

ROOF SLABS.

Aerocrete Western Corp., 612 N. Michigan	132
--	-----

ROOF TRUSSES.

American Roof Truss Co., 228 N. La Salle	520
McKeown Bros. Co., 112 W. Adams St.	302

ROOFING CONTRACTORS.

Asbestos Roofing & Insulation Co., Terminal Bldg., Aurora, Ill.	68
Moore, Edw., Rfg. Co., 2729 W. Madison	60

ROOFING—MATERIALS.

Amalgamated Rfg. Co., 431 S. Dearborn	691
Asbestos Roofing & Insulation Co., Terminal Bldg., Aurora, Ill.	68
Bird & Son, 1472 W. 76th St.	22
Johns-Manville, Inc., 230 N. Michigan	8
Moore, Edw., Rfg. Co., 2729 W. Madison	60

ROOFING TILE.

Federal Cement Tile Co., 608 S. Dearborn	16
Ludowici-Celadon Co., 104 S. Michigan	50

RUBBER TILE.

Salisbury, W. H., & Co., Inc., 308 W. Madison St.	44
Richardson, O. W., & Co., 125 S. Wabash	38
Wright Rubber Products Co., Racine, Wis.	4

RUGS & CARPETS.

Hardwick & McGee Co., 29 E. Madison St.	118
Richardson, O. W., & Co., 125 S. Wabash	38

SAND AND GRAVEL.

Dee, William E., Co., 30 N. La Salle St.	472
--	-----

**SASH, DOORS AND BLINDS.
(See Millwork)****SASH OPERATORS.**

Detroit Steel Prod. Co., 111 W. Wash.	422
Federal Steel Sash Co., Waukesha, Wis.	440
Ill. Hardware Co., 230 N. Michigan Ave.	96
Lupton, David, Sons Co., 333 N. Michigan	420
Swanson, Jas., & Son, 164 N. Clinton St.	90
Voigtmann & Co., 2543 W. 22nd St.	424

SASH—STEEL.

Detroit Steel Prod. Co., 111 W. Wash.	422
Federal Steel Sash Co., Waukesha, Wis.	440
Ideal Steel Products Co., 308 N. Michigan	66
Lupton, David, Sons Co., 333 N. Michigan	420
Voigtmann & Co., 2543 W. 22nd St.	424

SCAGLIOLA.

Kalteux, Nic., 220 S. State St.	694
---------------------------------	-----

SCHOOL FURNITURE.

Welch, W. M. Mfg. Co., 1515 Sedgwick	780
--------------------------------------	-----

SCREENS—WINDOW AND DOOR.

Chamberlin Metal Weather Strip Co., 704 S. Dearborn St.	72
---	----

SCUPPERS & FLOOR DRAINS.

Wade Iron Sanit. Mfg. Co., 1717 S. Canal	628
--	-----

SEAT OPERATING CLOSETS.

Rundell-Spence Mfg. Co., Milwaukee, Wis.	622
--	-----

SEATS—CLOSET.

Brunswick-Balke-Collender Co., 623 S. Wabash Ave.	12-624
Rundell-Spence Mfg. Co., Milwaukee, Wis.	622

SEWER PIPE.

Alabama Pipe Co., 122 S. Michigan	636
Dee, William E., Co., 30 N. La Salle St.	472
Stringer Bros. Co., 1100 W. 38th St.	636

SEWAGE EJECTORS AND BILGE PUMPS.

Chicago Pump Co., 2336 Wolfram St.	613
Wade Iron Sanit. Mfg. Co., 1717 S. Canal	628

SHADES—WINDOW.

Dienhart, Geo. B., & Sons, Inc., 228 N. La Salle St.	100
--	-----

SHEATHING MATERIALS.

Bird & Son, 1472 W. 76th St.	22
Insulite Co., 111 W. Washington St.	124
Johns-Manville, Inc., 230 N. Michigan	8

SHEET METAL CONTRACTORS.

B. & F. Heat. & Vent. Co., 228 N. La Salle	576
Biegler, Louis, Co., 165 N. Curtis St.	695
Gillespie-Dwyer Co., 2237 W. Lake St.	604
Gordon, Robert, Inc., 22 W. Austin Ave.	588
Haines Co., 1929 W. Lake St.	602
Monarch Vent. Co., 1523 Kingsbury St.	612
Western Ventilating & Engineering Co., 24 S. Clinton St.	612

SHEET METAL—ORNAMENTAL.

Friedley-Voshardt Co., 733 S. Halsted St.	464
---	-----

SHEET STEEL.

Inland Steel Co., 38 S. Dearborn St.	442
--------------------------------------	-----

SHINGLES.

(See Lumber)

SHINGLES—FIREPROOF.

Amalgamated Rfg. Co., 431 S. Dearborn	691
Asbestos Rfg. & Insulation Co., Terminal Bldg., Aurora, Ill.	68
Bird & Son, 1472 W. 76th St.	22
Cabot, Samuel, Inc., 5000 Bloomingdale	674
Johns-Manville, Inc., 230 N. Michigan	8
Moore, Edw., Rfg. Co., 2729 W. Madison	60

SHORING CONTRACTORS.

Friestedt, L. P. Co., 7 S. Dearborn St.	356
---	-----

SHOWER MIXERS.

Powers Regulator Co., 2796 Greenview	630
--------------------------------------	-----

SHOWER RECEPTORS.

Chicago Art Marble Co., 2883 Hillock St.	34
--	----

SHOWERS.

Powers Regulator Co., 2796 Greenview	630
--------------------------------------	-----

SIDEWALK DOORS.

Am. 3-Way Luxfer Prism Co., 1313 S. 55th Court, Cicero, Ill.	676-677
Richards & Kelly Mfg. Co., 309 W. 23rd	670

SIDEWALK AND VAULT LIGHTS.

Am. 3-Way Luxfer Prism Co., 1313 S. 55th Court, Cicero, Ill.	676-677
Richards & Kelly Mfg. Co., 309 W. 23rd	670

SIGNS—CHANGEABLE.

Robinson, T. L., & Co., 1458 W. Kinzie St.	672
Tablet & Ticket Co., 1021 W. Adams St.	26

SKYLIGHTS.

Am. 3-Way Luxfer Prism Co., 1313 S. 55th Ct., Cicero, Ill.	676-677
Biegler, Louis, Co., 165 N. Curtis St.	695
Detroit Steel Products Co., 111 W. Wash.	422
Federal Cement Tile Co., 608 S. Dearborn	16
Federal Steel Sash Co., Waukesha, Wis.	440
Lupton, David, Sons Co., 333 N. Michigan	420
Richards & Kelly Mfg. Co., 309 W. 23rd	670
Voigtmann & Co., 2543 W. 22nd St.	424

SLEEPER FILL.

Aerocrete Western Corp., 612 N. Michigan	132
--	-----

SLUICE GATES.

Crane Co., 836 S. Michigan Ave.	532-618
Imperial Brass Mfg. Co., 1232 W. Harrison	620
Wade Iron Sanitary Mfg. Co., 1717 S. Canal St.	628

SMOKE STACK LININGS.

Cent. Asbestos & Mfg. Co., 214 W. Grand	580
Ill. Fire Proof Covering Co., 216 W. Kinzie	584
Johns-Manville, Inc., 230 N. Michigan	8
Krez, Paul J., Co., 444 N. La Salle St.	578
Standard Asbestos Mfg. Co., 816 W. Lake	582

SOIL PIPE.

Alabama Pipe Co., 122 S. Michigan Ave.	636
Dec, William E., Co., 30 N. La Salle St.	472
Stringer Bros. Co., 1100 W. 38th St.	636

SOUND PROOFING.

Flax-Li-Num Insulating Co., 228 N. La Salle St.	128
Insulite Co., 111 W. Washington St.	124
Johns-Manville, Inc., 230 N. Michigan	8
Masonite Corp., 111 W. Washington St.	126
Wood Conversion Co., 360 N. Michigan	76

SPIRAL CHUTES.

Link-Belt Co., 300 W. Pershing Road	152
Olson, Samuel, & Co., 1238 N. Kostner	14
Weller Mfg. Co., 1820 N. Kostner Ave.	154

SPRINKLER SYSTEMS.

Diener, Geo. W., Mfg. Co., 400 N. Monticello Ave.	92
Am. Fire Protection Co., 9 S. Clinton St.	610

STAINS.

Cabot, Samuel, Inc., 5000 Bloomingdale	674
Detroit Graphite Co., 208 S. La Salle St.	650
DuPont, E. I. de Nemours & Co., 2100 Elston Ave.	646
Moore, Benj., & Co., 415 N. Green St.	652
Pratt & Lambert, Inc., 320 W. 26th St.	644
U. S. Gutta Percha Paint Co., 651 W. Washington St.	654

STAIRS AND RAILINGS—WOOD.

Anderson & Lind Mfg. Co., 2127 Iowa St.	506
Chicago Sash, Door & Blind Mfg. Co., 1249 W. North Ave.	510
Edmunds Mfg. Co., 2016 Washburne Ave.	494
Johnson-Schweizer Co., 1249 W. North	510
Kasjab, Joseph, 1436 W. 21st St.	502
Matthews Bros. Mfg. Co., 333 N. Michigan	496
Ringwald, B. R., & Sons Co., 8082 S. Chicago Ave.	504
Schick-Johnson Co., 1737 N. Paulina St.	500
West Woodworking Co., 300 N. Ada St.	498

STAIRS—IRON AND BRONZE.

(See Architectural Iron and Bronze)

STAIRS—STEEL.

Guaranty Iron & Steel Co., 3347 W. Lake	452
Woodbridge Ornamental Iron Co., 1519 Altgeld St.	450

STEAM HEATING.

(See Heating—Hot Water and Steam)

STEAM GENERATORS.

Am. Radiator Co., 816 S. Michigan Ave.	540
Johnson Service Co., 1355 Washn. Blvd.	611
Kewanee Boiler Co., 1858 S. Western Ave.	526
Pacific Boiler Sales Corp., 228 N. La Salle	544
Young Radiator Co., 6 N. Michigan Ave.	542

STEEL BARS FOR REINFORCING CONCRETE.

(See Reinforcing Bars)

STEEL PLATES.

Inland Steel Co., 38 S. Dearborn St.	442
--------------------------------------	-----

STOKERS.

Modern Coal Burner Co., 20 N. Wacker Drive	
Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362

STONE—CAST.

Benedict Stone Inc., 105 W. Adams St.	32
Plastic Products Co., 1991 Port Washington Road, Milwaukee, Wis.	138

STONE—BUILDING.

Fluck Cut Stone Co., 1229 E. 74th St.	482
Indiana Limestone Corp., 435 N. Michigan Ave.	476-478-480
Wisconsin Lime & Cement Co., 111 W. Washington St.	122

STONE—PRESSURE RELIEVING JOINT.

Cowing Pressure Relieving Joint Co., 160 N. Wells St.	484
---	-----

STONE—SETTING

Archer Stone Setting Co., 228 N. La Salle	486
---	-----

STORE FRONTS—METAL CONSTRUCTION.

Brasco Mfg. Co., Harvey, Ill.	98
Federal Steel Sash Co., Waukesha, Wis.	440
Zouri Drawn Metals Co., Chgo. Hgts., Ill.	668

STORE AND OFFICE PICTURES.

Anderson & Lind Mfg. Co., 2127 Iowa St.	506
Brunswick-Balke-Collender Co., 623 S. Wabash Ave.	12-624
Edmunds Mfg. Co., 2016 Washburne Ave.	494
Johnson-Schweizer Co., 1249 W. North	510
Kasjab, Joseph L., 1436 W. 21st St.	502
Matthews Bros. Mfg. Co., 333 N. Michigan	496
Pick-Barth, Albert, Cos., 224 W. Randolph	6
Ringwald, B. R., & Sons Co., 8082 S. Chicago Ave.	504
Schick-Johnson Co., 1737 N. Paulina St.	500
West Woodworking Co., 300 N. Ada St.	498

STOVES—GAS.

Cribben & Sexton Co., 700 N. Sacramento	416
Crown Stove Works, 4631 W. 12th Place, Cicero, Ill.	418
Peoples Gas Light & Coke Co., 122 S. Michigan Ave.	414-558
Pick-Barth, Albert, Cos., 224 W. Randolph	6
Van Range, John Co., 1200 W. 35th St.	6

STRAINERS—SUCTION.

Dunham, C. A., 450 E. Ohio St.	536
--------------------------------	-----

STRUCTURAL IRON AND STEEL.

American Bridge Co., 208 S. La Salle St.	436
Duffin Iron Co., 4837 S. Kedzie Ave.	438
Halsted, Joseph, Co., 31st and Spaulding	456
Inland Steel Co., 38 S. Dearborn St.	442
Union Foundry Works, 38 S. Dearborn St.	693

STUCCO.

Marblehead Lime Co., 160 N. La Salle St.	120
U. S. Gypsum Co., 300 W. Adams St.	42

SURETY BONDS.

Builders & Mfrs. Mutual Casualty Co., 120 S. La Salle St.	18
---	----

SWIMMING POOL ENCLOSURES.

Foley Greenhouse Mfg. Co., Forest Park, Ill.	54
--	----

SWITCHBOARDS.

Benjamin Electric Mfg. Co., 111 S. Canal	358
Berthold, Gus, Electric Co., 551 W. Monroe St.	376
Electric Apparatus Co., 702 N. Halsted	368
Trumbull Electric Mfg. Co., 2001 W. Pershing Road	364
Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362

SWITCH PLATES.

Bryant Electric Co., 844 W. Adams St.	370
Hubbell, Harvey, Inc., 318 W. Washn.	372

SWITCHES—ELECTRIC.

Appleton Electric Co., 1721 Wellington	360
Hubbell, Harvey, Inc., 318 W. Washn.	372
Trumbull Electric Mfg. Co., 2000 W. Pershing Road	364
Westinghouse Electric & Mfg. Co., 20 N. Wacker Drive	362

TANKS—IRON AND STEEL.

Kewanee Boiler Co., 1858 S. Western Ave.	526
--	-----

TEMPERATURE REGULATORS.

Dunham, C. A., Co., 450 E. Ohio St.	536
Johnson Service Co., 1355 Washington	611
Powers Regulator Co., 2796 Greenview	630

TERRA COTTA.

Am. Terra Cotta & Ceramic Co., 228 N. La Salle St.	36
Midland Terra Cotta Co., 105 W. Monroe	30
Northwestern Terra Cotta Co., 2525 Clybourn Ave.	10

TERRAZZO.

Kalteux, Nic., 220 S. State St.	694
Western Mosaic & Terrazzo Co., 4214 Ogden Ave.	430

THERMOSTATS.

Dunham, C. A., Co., 450 E. Ohio St.	536
Johnson Service Co., 1355 Washington	611
Powers Regulator Co., The, 2796 Greenview Ave.	630
Trane Co., 844 Rush St.	566

TILE—ART MARBLE.

Chicago Art Marble Co., 2883 Hillock	34
--------------------------------------	----

TILE—CERAMIC, ETC.

Am. Encaustic Tiling Co., 332 S. Mich.	426
Hawkinson, John S., Co., 80 E. Jackson	432
Interior Tiling Co., 21 E. Van Buren St.	432
Udpike & Co., 612 N. Michigan Ave.	428
Western Mosaic & Terrazzo Co., 4214 Ogden Ave.	430

TILE—CORK.

Richardson, O. W., & Co., 125 S. Wabash	38
---	----

TILE—FLOORS.

Am. Encaustic Tiling Co., 332 S. Mich.	426
Enterprise Marble Co., 1141 Newport Ave.	84
Hawkinson, John S., Co., 80 E. Jackson	432
Interior Tiling Co., 21 E. Van Buren St.	432
Peerling Marble Co., 2891 Hillock Ave.	2
Tompkins-Kiel Marble Co., 400 N. Mich.	20
Udpike & Co., 612 N. Michigan Ave.	428
Western Mosaic & Terrazzo Co., 4214 Ogden Ave.	430

TILE—GYPSUM.

U. S. Gypsum Co., 300 W. Adams St.	42
------------------------------------	----

TILE—HOLLOW.

Dee, William E., Co., 30 N. La Salle St.	472
Ill. Fireproof Constr. Co., 228 N. La Salle	470
Interstate Fireproofing Co., 844 Rush St.	470
Natl. Fireproofing Co., 228 N. La Salle St.	468

TILE—MARBLE.

Peerling Marble Co., 2891 Hillock Ave.	2
Tompkins-Kiel Marble Co., 400 N. Mich.	20

TILE—METAL.

Chromite Co., 228 N. La Salle St.	116
-----------------------------------	-----

TILE—ROOF.

Federal Cement Tile Co., 608 S. Dearborn St.	16
Ludowici-Celadon Co., 104 S. Michigan	50

TILE RUBBER.

Salisbury, W. H., & Co., 308 W. Madison	44
Richardson, O. W., & Co., 125 S. Wabash	38
Wright Rubber Products Co., Racine, Wis.	4

TILE WAINSCOTING.

Am. Encaustic Tiling Co., 332 S. Mich.	426
Chicago Art Marble Co., 2883 Hillock	34
Enterprise Marble Co., 1141 Newport Ave.	84
Hawkinson, John S., Co., 80 E. Jackson	432
Interior Tiling Co., 21 E. Van Buren St.	432
Peerling Marble Co., 2891 Hillock Ave.	2
Thompkins-Kiel Marble Co., 400 N. Mich.	20
Udpike & Co., 612 N. Michigan Ave.	428
Western Mosaic & Terrazzo Co., 4214 Ogden Ave.	430

TOILET PAPER DISPENSERS

Northern Paper Mills Co., 914 Wrigley Bldg.	634
---	-----

TOILET PARTITIONS.

Chicago Art Marble Co., 2883 Hillock Ave.	34
Peerling Marble Co., 2891 Hillock Ave.	2
Sanitary Constr. Co., 1476 W. Austin	632
Tompkins-Kiel Marble Co., 400 N. Mich.	20
Vitrolite Co., 120 S. La Salle St.	666

TOWEL CABINETS

Northern Paper Mills, 914 Wrigley Bldg.	634
---	-----

TRAPS—STEAM.

Davis, G. M., Reg. Co., 428 Milwaukee	613
Dunham, C. A., Co., 450 E. Ohio St.	536
Ill. Engr. Co., W. 21st and S. Racine	554
Milwaukee Valve Co., Milwaukee, Wis.	550
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Trane Co., 844 Rush St.	566

TREADS—SAFETY.

Chicago Art Marble Co., 2883 Hillock	34
--------------------------------------	----

TRUSSES—WOOD.

American Roof Truss Co., 228 N. La Salle	520
McKeown Bros. Co., 112 W. Adams St.	302

TURN TABLES.

American Bridge Co., 208 S. La Salle St.	436
--	-----

URINAL STALLS.

Clow, Jas. B., & Sons, 201 N. Talman Ave.	614
Crane Co., 836 S. Michigan Ave.	532-618
Standard Sanitary Mfg. Co., 900 S. Mich.	616
Weil-McLain Co., 641 W. Lake St.	530

VALVES—BACK PRESSURE.

Am. Radiator Co., 816 S. Michigan Ave.	540
Crane Co., 836 S. Michigan Ave.	532-618
Davis, G. M., Reg. Co., 428 Milwaukee	613
Dunham, C. A., Co., 450 E. Ohio St.	536
Ill. Eng. Co., W. 21st and S. Racine Ave.	554
Milwaukee Valve Co., Milwaukee, Wis.	550
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Trane Co., 844 Rush St.	566
Wade Iron Sanitary Co., 1717 S. Canal	628

VALVES—FLUSH.

Crane Co., 836 S. Michigan Ave.	532-618
Imperial Brass Mfg. Co., 1232 W. Harrison St.	620

VALVES—PACKLESS.

Am. Radiator Co., 816 S. Michigan Ave.	540
Crane Co., 836 S. Michigan Ave.	532-618
Dunham, C. A., Co., 450 E. Ohio St.	536
Ill. Eng. Co., W. 21st and S. Racine Ave.	554
Milwaukee Valve Co., Milwaukee, Wis.	550
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Trane Co., 844 Rush St.	566

VALVES—PRESSURE REDUCING.

Am. Radiator Co., 816 S. Michigan Ave.	540
Crane Co., 836 S. Michigan Ave.	532-618
Dunham, C. A., Co., 450 E. Ohio St.	536
Ill. Eng. Co., W. 21st and S. Racine Ave.	554
Imperial Brass Mfg. Co., 1232 W. Harrison St.	620
Milwaukee Valve Co., Milwaukee, Wis.	550
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Powers Regulator Co., 2796 Greenview	630
Trane Co., 844 Rush St.	566

VALVES—REGULATING.

Am. Radiator Co., 816 S. Michigan Ave.	540
Crane Co., 836 S. Michigan Ave.	532-618
Davis, G. M., Reg. Co., 428 Milwaukee	613
Dunham, C. A., Co., 450 E. Ohio St.	536
Ill. Eng. Co., W. 21st and S. Racine Ave.	554
Imperial Brass Mfg. Co., 1232 W. Harrison St.	620
Milwaukee Valve Co., Milwaukee, Wis.	550
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Trane Co., 844 Rush St.	566

VALVES—SPRINKLER ALARM.

(See Sprinkler Systems)

VALVE—VENT—AIR.

Am. Radiator Co., 816 S. Michigan Ave.	540
Dunham, C. A., Co., 450 E. Ohio St.	536
Milwaukee Valve Co., Milwaukee, Wis.	550
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Trane Co., 844 Rush St.	566

VALVES—WATER MIXERS.

Am. Radiator Co., 816 S. Michigan Ave.	540
O. E. Specialty Mfg. Corp., 1710 St. Paul Ave., Milwaukee, Wis.	570
Powers Regulator Co., 2796 Greenview	630

VARNISH MANUFACTURERS.

Du Pont, E. I. de Nemours & Co., 100 Elston Ave.	646
Moore, Benj., & Co., 415 N. Green St.	652
Pratt & Lambert, Inc., 320 W. 26th St.	644

VENTILATORS.

Gillespie-Dwyer Co., 237 W. Lake St.	604
Western Ventilating & Eng. Co., 9 S. Clinton St.	612

VENTILATING SYSTEMS.

B. & F. Heating & Vent. Co., 228 N. La Salle St.	576
Baldwin, J. P., Co., 1304 W. Washington	606
Claffey, E. J., Co., 10 W. Illinois St.	590
Ensign Eng. Co., 35 E. Wacker Drive	600
Evans, Chas. E., & Co., 7 S. May St.	598
Gillespie-Dwyer Co., 2237 W. Lake St.	604
Glennon-Bielke Co., 3045 Irving Pk. Blvd.	607
Gordon, Robt., Inc., 22 W. Austin Ave.	588
Haines Co., 1929 W. Lake St.	602
Johnson, C. W., Inc., 211 N. Desplaines	586
Kilander, A., & Co., 126 S. Clinton St.	606
Kohlbray-Howlett Co., 63 W. Ontario St.	594
Lees, Wm., 548 Washington Blvd.	609
Mehring & Hanson Co., 162 N. Clinton St.	608
Monarch Vent. Co., 1523 Kingsbury St.	612
Phillips, Getschow Co., 421 N. State St.	607
Pope, Wm. A., 26 N. Jefferson St.	609
Reger, H. P., & Co., 1501 E. 72nd Place	596
Thumm, W. F., Inc., 1130 Cornelia Ave.	592
Western Ventilating & Engineering Co., 24 S. Clinton St.	612

WAINSCOTING

Am. Encaustic Tiling Co., 332 S. Michigan	426
Chicago Art Marble Co., 2883 Hillock Ave.	34
Chromite Co., 228 N. La Salle St.	116
Enterprise Marble Co., 1141 Newport Ave.	84
Hawkinson, John S., Co., 80 E. Jackson	432
Interior Tiling Co., 21 E. Adams St.	432
Kalteux, Nic., 220 S. State St.	694
Peerling Marble Co., 2891 Hillock Ave.	2
Sanitary Constr. Co., 1476 W. Austin Ave.	632
Tompkins-Kiel Marble Co., 400 N. Mich.	20
Udpike & Co., 612 N. Michigan Ave.	428
Vitrolite Co., 120 S. La Salle St.	666
Western Mosaic & Terrazzo Co., 4214 Ogden Ave.	430

WALL BEDS.

Pick-Barth, Albert, Cos., 224 W. Randolph	6
---	---

WALL BOARD.

Bird & Son, 1472 W. 76th St.	22
Insulite Co., 111 W. Washington St.	124
U. S. Gypsum Co., 300 W. Adams St.	42

WALL COPING.

Am. Terra Cotta & Ceramic Co., 228 N. La Salle St.	36
Dee, Wm. E., Co., 30 N. La Salle St.	472
Ill. Fire-Proof Constr. Co., 228 N. La Salle St.	470
Interstate Fire Proofing Co., 844 Rush St.	470
Midland Terra Cotta Co., 105 W. Monroe	30
Nat. Fire Proofing Co., 228 N. La Salle	468
Northwestern Terra Cotta Co., 2525 Clybourn Ave.	10

WALL TILE—METAL.

Chromite Co., 228 N. La Salle St.	116
-----------------------------------	-----

WASTE CANS.

Diener, Geo. W., Mfg. Co., 400 N. Monticello Ave.	92
---	----

WASHING MACHINES

Am. Laundry Mch. Co., 633 S. Wabash	46
Commonwealth Edison Co., 72 W. Adams	384
Gen. Laundry Mch. Co., 822 W. Washington	48
Peoples Gas, Light & Coke Co., 122 S. Michigan Ave.	414-558
Pick-Barth, Albert, Cos., 224 W. Randolph	6

WATER FILTERS.

Everson, C. G., & Co., 215 N. Dearborn	378
--	-----

WATER FLOW ALARMS AND SIGNALS.

Am. Fire Protection Co., 9 S. Clinton St.	610
---	-----

WATER HEATERS—AUTOMATIC.

Crane Co., 836 S. Michigan Ave.	532-618
Kewanee Boiler Co., 1858 S. Western Ave.	526
Westinghouse Electric Mfg. Co., 20 N. Wacker Drive	362

WATERPROOFING.

Asbestos Roofing & Insulation Co., Terminal Bldg., Aurora, Ill.	68
Bird & Son, 1472 W. 76th St.	22
Central Ironite Waterproofing Co., 111 W. Washington	80
Fulton Asphalt Co., 228 N. La Salle St.	86
Johns-Manville, Inc., 230 N. Michigan	8
Moore, Edw., Roofing Co., 2729 W. Madison St.	60

WEATHER STRIPS—METAL.

Chamberlin Metal Weather Strip Co., 704 S. Dearborn St.	72
Federal Metal Weather Strip Co., 4538 Fullerton Ave.	74
Sager Metal Weather Strip Co., 2531 Homer	70

WINDOW ADJUSTERS.

Detroit Steel Prod. Co., 111 W. Wash.	422
Federal Steel Sash Co., Waukesha, Wis.	440
Lupton, David, Sons Co., 333 N. Michigan	420
Ill. Hardware Co., 230 N. Michigan Ave.	96
Norton Door Closer Co., 2900 N. Western	88
Norton Lasier Co., 466 W. Superior St.	94
Swanson, Jas., & Son, 164 N. Clinton St.	90
Voigtmann & Co., 2543 W. 22nd St.	424

WINDOW GUARDS.

Cyclone Fence Co., Waukegan, Ill.	62
-----------------------------------	----

WINDOW LOCKS.

Grand Specialties Co., 3101 W. Grand	156
Ideal Steel Products Co., 308 N. Michigan	66

WINDOW SHADES.

Dienhart, Geo. B., & Son, Inc., 228 N. La Salle St.	100
---	-----

WINDOW AND DOOR SCREENS

Chamberlin Metal Weather Strip Co., 704 S. Dearborn St.	72
---	----

WINDOWS—STEEL CASEMENT.

(See Sash Steel)

WIRE—ELECTRIC.

Mark, Clayton, & Co., 111 W. Washington	374
Indiana Rubber & Insulated Wire Co., 140 S. Dearborn St.	366

WIRE—RUBBER COVERED.

Indiana Rubber & Insulated Wire Co., 140 S. Dearborn St.	366
--	-----

WIRE WORK.

Cyclone Fence Co., Waukegan, Ill.	62
General Bronze Corp., 228 N. La Salle St.	462
Guaranty Iron & Steel Co., 3847 W. Lake	452
Halsted, Joseph, Co., 31st and Spaulding	456
Heath, J. S., Co., Waukegan, Ill.	458
Ingenman, L. S., Ornamental Iron Co., 157 Wendell St.	460
Tyler Co., 310 S. Michigan Ave.	

Inside Front Cover

Union Fdry. Works, 38 S. Dearborn St.	693
Western Archl. Iron Co., 3455 Elston Ave.	454
Woodbridge Ornamental Iron Co., 1519 Altgeld St.	450

WOOD COLUMNS.

Hartman-Sanders Co., 2155 Elston Ave.	695
---------------------------------------	-----

WOOD CARVING.

Robinson, T. L., & Co., 1458 W. Kinzie St.	672
--	-----

WOOD MANTELS AND CONSOLES.

Architectural Decorating Co., 1600 S. Jefferson	56
Colonial Fireplace Co., 4626 W. Roosevelt	28

WOOD FILES.

Lake Superior Piling Co., 2464 S. Loomis	691
--	-----

WOOD TURNING.

Hartman-Sanders Co., 2155 Elston Ave.	695
---------------------------------------	-----

WOODWORKING.

(See Interior Finish)

WRECKING CONTRACTORS.

Herlihy Mid-Continent Co., 228 N. La Salle St.	352
Newman, W. J., Co., 21 N. Curtis St.	394

INDEX TO ADVERTISERS

A	Page	Page
Adams, William, Co.....	338	Chicago Concrete Breaking Co..... 130
Aerocrete Western Corporation.....	132	Chicago Faucet Co., The..... 626
Alabama Pipe Co.....	636	Chicago Flexatite Floor Co..... 114
Appleton Electric Co.....	360	Chicago Pump Co..... 613
Amalgamated Roofing Co.....	691	Chicago Sash, Door Manufacturing Co. 510
American Automatic Fire Protection Co.	610	Chromite Co..... 116
American Bridge Co.....	436	Claffey, E. J., Co..... 590
American Encaustic Tiling Co., Ltd....	426	Clemetsen Co., The..... 508
American Laundry Machinery Co., The	46	Clow, James B. & Sons..... 614
American Radiator Co.....	540	Colonial Fireplace Co..... 28
American Roof Truss Co.....	520	Commonwealth Edison Co..... 384-408
American 3 Way-Luxfer Prism Co..676-677		Comstock, L. K., & Co..... 396
American Terra Cotta & Ceramic Co., The	36	Concrete Engineering Co..... 446
Anderson, A. & E. Co.....	348	Connole, M. M., Co..... 572
Anderson, Edward A., Co.....	330	Continental Chimney Co..... 472
Anderson & Lind Manufacturing Co..	506	Cooper, R. Jr., Inc..... 406
Archer Stone Setting Co.....	486	Corboy, M. J., Co..... 638
Architectural Decorating Co.....	56	Cowing Pressure Relieving Joint Co... 484
Ardmore Construction Co.....	332	Crane Co..... 532-618
Asbestos Roofing & Insulation Co....	68	Cribben & Sexton Co..... 416
B	Page	D
B. & F. Heating & Ventilating Co....	576	Dahl-Stedman Co..... 290
Baldwin J. P. Co.....	606	Dahlstrom Metallic Door Co..... 142
Balhatchet, William, Co.....	688	Davis, G. M., Regulator Co..... 613
Barnard, H. B.....	284	Dearborn Electrical Construction Co.. 392
Beardslee Chandelier Mfg. Co.....	380	Dee, William E., Co..... 472
Benedict Stone, Inc.....	32	Detroit Graphite Co..... 650
Benjamin Electric Mfg. Co.....	358	Detroit Steel Products Co..... 422
Berthold, Gus., Electric Co.....	376	Diener, Geo. W., Mfg. Co..... 92
Betz, Frank S., Co.....	58	Dienhart, George B. & Son, Inc..... 100
Biegler, Louis, Co.....	695	Dilks Construction Co..... 294
Bird & Son, Inc.....	22	Dovetail Anchor Slot Co., The..... 140
Bishop Lumber Co.....	488	Duffin Iron Co..... 438
Black, Robert, Co.....	318	Duffy-Noonan Construction Co..... 322
Blake, Chas. G., Co.....	158	Dunham, C. A., Co..... 536
Bond, Ralph A., Co.....	518	Du Pont, E. I., De Nemours & Co., Inc. 646
Brasco Manufacturing Co.....	98	Duval Construction Co..... 334
Brown, James J., Plastering Co.....	684	Dwyer Equipment Co..... 552
Brundage, Avery, Co.....	298	E
Brunswick-Balke-Collender Co., The.12-624		Economy Fuse Mfg. Co..... 382-383
Bryant Electric Co., The.....	370	Edmunds Manufacturing Co..... 494
Bryant Heater & Mfg. Co., The.....	560	Electric Apparatus Co..... 368
Builders & Manufacturers Mutual Casualty Co., The.....	18	Elevator Company of America..... 146
Bulley & Andrews.....	324	Ensign Co., The..... 600
Burson Brothers.....	686	Enterprise Marble Co..... 84
C	Page	Ericsson, John E., Co..... 328
Cabot, Samuel, Inc.....	674	Ericsson, Henry Co..... 286
Cadenhead Co.....	340	Evans, Charles E., & Co..... 598
Calumet Steel Co.....	448	Everson, C. G., & Co..... 378
Carbondale Machine Co., The.....	64	F
Cellized Oak Flooring, Inc.....	522	Federal Cement Tile Co..... 16
Central Asbestos & Magnesia Co.....	580	Federal Metal Weather Strip Co..... 74
Central Ironite Waterproofing Co.....	80	
Chamberlin Metal Weatherstrip Co....	72	
Chicago Art Marble Co.....	34	

	Page		Page
Federal Steel Sash Co.....	440	Johnson, Chas & Son, Fire Escape Co..	444
Ferguson & Lange Foundry Co.....	538	Johnson, C. W., Inc.....	586
Flax-Li-Num Insulating Co.....	128	Johnson-Schweizer Co.....	510
Fluck Cut Stone Co., Inc.....	482	Johnson Service Co.....	611
Foley Greenhouse Mfg. Co., The.....	54		
French, J. B., Co.....	326	K	
Friedley-Voshardt Co.....	464	Kalman Floor Co.....	112
Friestedt, H. F., Co.....	342	Kalteux, Nic.....	694
Friestedt, L. P., Co.....	356	Kalteux-Brown Co.....	690
Fuchs Electric Co.....	390	Kaszab, Joseph.....	502
Fulton Asphalt Co.....	86	Kellogg-Mackay Co., The.....	524
		Kelvinator Sales Corp.....	412
G		Kerner Incinerator Co.....	528
Gage, Thos. G., Co.....	336	Kewanee Boiler Corp.....	526
General Bronze Corp.....	462	Kilander, A., & Co.....	606
General Laundry Machinery Corp.....	48	Kohlby-Howlett Co.....	594
Gillespie-Dwyer Co.....	604	Krahl Construction Co.....	308
Glennon-Bielke Co.....	607	Krez, Paul J., Co.....	578
Gordon, Robert, Inc.....	588		
Goss & Guise.....	690	L	
Grand Specialties Co.....	156	Lake Superior Piling Co.....	691
Great Lakes Construction Co.....	344	Lally Column Co. of Chicago.....	52
Griffiths, John & Son Co.....	276	Lammert & Mann Co.....	568
Guaranty Iron & Steel Co.....	452	Lamont, L. H., & Co.....	394
		Laquist Construction Co.....	282
H		Larson, Algot B., Co.....	300
Haines Co., The.....	602	Lees, William, Inc.....	609
Halsted, Joseph, Co.....	456	Lennox-Haldeman Co.....	689
Hanson Brothers Co.....	350	Link-Belt Co.....	152
Hartmann-Sanders Co.....	695	Ludowici-Celadon Co.....	50
Hardwick & McGee Co.....	118	Lupton's, David, Sons Co.....	420
Hatfield Electric Co.....	398	Lynch, W. J., Co.....	346
Hawkinson, John S., Co.....	432		
Heath, J. S., Co.....	458	M	
Herlihy Mid-Continent Co.....	352	Maas-Manson Co.....	306
Hines, Edward, Lumber Co.....	490	Marblehead Lime Co.....	120
Hockaday, Inc.	648	Mark, Clayton, & Co.....	374
Hubbell, Harvey, Inc.....	372	Marsh, James P., & Co.....	548
Hunt, Robert W., Co.....	24	Masonite Corp.	126
Hydraulic-Press Brick Co.....	106	Matot, D. A.....	82
		Matthews Bros. Mfg. Co.....	496
I		McKeown Bros. Co.....	302
Ideal Steel Products Co.....	66	McLennan Construction Co.....	316
Illinois Brick Co.....	108	McNulty Bros. Co.....	682
Illinois Engineering Co.....	554	McQuay Radiator Corp.....	574
Illinois Fire Proof Construction Co....	470	Mehring & Hanson Co.....	608
Illinois Fire Proof Covering Co.....	584	Midland Terra Cotta Co.....	30
Illinois Hardware Co.....	96	Milwaukee Valve Co.....	550
Imperial Brass Manufacturing Co., The	620	Modern Coal Burner Co., Inside Back Cover	
Indiana Limestone Co.....	476-478-480	Monarch Ventilating Co.....	612
Indiana Rubber & Insulated Wire Co., The.....	366	Moore, Benjamin, & Co.....	652
Ingeman, L. S., Ornamental Iron Co..	460	Moore, Edward, Roofing Co., The....	60
Inland Steel Co.....	442	Moses, C. A., Construction Co.....	288
Insulite Co., The.....	124	Moulding, Thos., Brick Co.....	110
Interstate Fireproofing Co.....	470	Mueller, L. J., Furnace Co.....	556
Interior Tiling Co.....	432	Muller, Franklyn R., Inc.....	1
		Murphy Plumbing Co.....	640
		N	
J		National Fire Proofing Co.....	468
Janisch, H. & Co.....	320	Nelson, W. P., Co.....	656
Janows & Kramer Co.....	694	Newgard, Henry, & Co.....	386
Johns-Manville Corp.....	8		

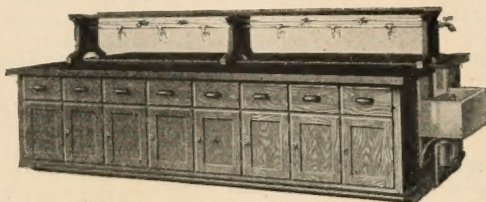
TABLE OF CONTENTS

	Page
Administrative Code, Extracts from, of the State of Illinois.....	33
Advertisers, Alphabetical List of.....	775
Advertisers, Classified List of.....	762
American Institute of Architects, Chapter Presidents and Secretaries.....	105
American Institute of Steel Construction Code of Practice.....	451
Announcement	7
Architects, List of Registered, State of Illinois.....	59
Architects, Registration Rules and Regulations, State of Illinois.....	45
Architects, Registration, States Requiring.....	49
Architectural Registration Boards, National Council of.....	51
Architectural Act, The State of Illinois.....	39
Architectural Sketch Club Offices and Members, List of.....	115
Associated Builders of Chicago, Officers and Committees.....	129
Beams, Yellow Pine and Douglas Fir, Table of Strength.....	521
Bedford or Indiana Limestone, Standard Specification.....	477
Building Construction Employers Assn., Executive Board and Committees.....	127
Building Ordinance, City of Chicago (See Index 159), (Special Ruling 315).....	176
Building Trades, Wages.....	131
Canons of Professional Ethics of the Illinois Society of Architects.....	25
Catalogues and Printed Matter, Suggestions for Firms Issuing Same.....	125
Charges, Proper Minimum, Schedule of and Professional Practice of Architects.....	31
Chicago Master Steam Fitters Assn., Standards.....	535
Chicago Chapter American Institute of Architects, Officers and Members.....	109
Chicago Council, Members.....	141
Chicago Council, Standing Committees.....	143
Chimney Specification	557
City Hall and County Building Directory.....	133
City Officials of Chicago.....	139
Clay, Hollow Building Tile Specifications.....	469
Code, Civil Administrative, of the State of Illinois, Extracts from.....	33
Commonwealth Edison Co.'s System, Rules and Information Pertaining to Electric Service Meters and Wiring.....	385
Concrete Floors, Standard Specifications for.....	463
Concrete Reinforcement Bars, Billet-Steel, Standard Specifications for.....	447
Concrete Reinforcement Bars, Rail-Steel, Standard Specifications for.....	449
Contract Forms, Issued by the Illinois Society of Architects.....	123
Concrete Work, Rule of Measurement.....	685
Cooling the Air in Factories.....	581
Cut Stone, Standard Form of Specification.....	477
Decorative, Protective, Preservative Coverings.....	661
Dewey Index for Filing Catalogues, Drawings, Plates, etc.....	747
Douglas Fir and Yellow Pine Beams Table of Strength.....	521
Editorial, Illinois Society of Architects.....	19
Electricity, Department of, City of Chicago.....	359
Electrical Information, Department of Electricity, City of Chicago.....	373
Electrical Inspection, Sections of the City Code Governing Same.....	361
Enamels, Fillers, Stains, Varnishes.....	645
Engravings.....	
Board of Arbitration of the Illinois Society of Architects.....	13
Committee on Public Action of the Illinois Society of Architects.....	15
Directors of the Illinois Society of Architects.....	11
Examining Committee of Architects, State of Illinois.....	17
Officers of the Illinois Society of Architects.....	9
Ethics, Professional Canons of the Illinois Society of Architects.....	25
Fillers, Stains, Varnishes and Enamels.....	645
Filing Index, Dewey System for Catalogues, Drawings, Plates, etc.....	747
Fireproofing, Hollow Tile, Specifications Recommended for.....	169
Floors, Concrete, Standard Specifications for.....	463
Floor Loads, Live, in Pounds, per Square Foot, Building Code Requirements in Various Cities.....	467
Gas Fitters' Rules for Piping Buildings, People's Gas, Light & Coke Co.'s System.....	415
Gas Heating	559
Glass and Glazing.....	667
Head Room, Minimum Requirements for Smokeless Settings.....	549
Heating by Gas.....	559
Heating and Ventilation.....	525
Heating and Ventilating, Suggestions for Operating Large High School Plant.....	575

Heating, Hot Water Two-pipe Non-short Circuit System.....	59
Heating, Oil	563
Hollow, Clay, Building Tile, Specifications.....	469
Hot Water Heating, Two-pipe Non-Short Circuit System.....	551
Illinois Building Contract Documents, Issued by the Illinois Society of Architects.....	123
Illinois Society of Architects, Officers, Committees, Members, List of.....	87
Index Relative to Miscellaneous and Useful Information.....	758
Indiana Limestone, Standard Specification.....	477
Lien Law, Mechanic's.....	145
Limestone, Cut, Standard Specifications.....	477
Loads, Live, in Pounds per Square Foot, Building Code Requirements in Various Cities..	467
Lumber, Standardization	489
Lumber, Table of Strengths, Loads in Pounds uniformly distributed—Based on Dressed Sizes	521
Mason Work, Rules of Measurement.....	685
Mechanic's Lien Law, State of Illinois.....	145
Mechanical Refrigeration	409
Miscellaneous and Useful Information Concerning Building, Engineering Trades and Materials, See Index 758.....	697
National Council of Architectural Registration Boards.....	51
Office Practice	121
Oil Heating	563
Plastering, Standard Rules of Measurement of.....	679
Plumbing, Proportioning of Soil Waste and Vent Pipes.....	639
Preface	5
Printed Matter and Catalogues, Suggestions for Firms Issuing Same.....	125
Professional Ethics, Canons of, Illinois Society of Architects.....	25
Professional Practice of Architects and Proper Minimum Charges, Recommended by the Illinois Society of Architects.....	31
Preservative, Protective and Decorative Coverings.....	661
Radiator Quantities and Heating Plants, Rules for Computing.....	535
Refrigeration, Mechanical	409
Registration of Architects, State of Illinois.....	59
Reinforcement Bars, Concrete, Billet-Steel, Standard Specifications for.....	447
Reinforcement Bars, Concrete, Rail-Steel, Standard Specifications for.....	449
Sanitary Code, Sections of Interest to Architects, with Index.....	585
Sanitation of Buildings.....	615
Smoke Ordinance	553
Smokeless Settings, Minimum Head Room Requirement for.....	549
Soil Waste and Vent Pipes in Plumbing Systems.....	639
Stains, Fillers, Varnishes and Enamels.....	645
States Requiring Architectural Registration.....	49
Steamfitters, Chicago Master Association Standards.....	535
Steel-Billet, Concrete Reinforcement Bars, Standard Specifications for.....	447
Steel Construction, American Institute of, Code of Practice.....	451
Steel Prices, Comparative Table, 1900-1929.....	445
Steel-Rail, Concrete Reinforcement Bars, Standard Specifications for.....	449
Steel, Structural, for Buildings, Standard Specifications.....	437
Stone, Cut, Standard Specifications for.....	477
Structural Steel for Buildings, Standard Specifications.....	437
Subject Index for Filing Catalogues, Drawings, Plates, etc.....	747
Tile, Hollow Clay Building, Specifications.....	469
Tilework, Basic, Specifications for.....	427
Title Page	3
Trades, Building, Wages.....	131
Wages, Building Trades, per Hour in Chicago.....	131
Varnishes, Stains, Fillers and Enamels.....	645
Vent and Soil Waste Pipes in Plumbing Systems.....	639
Ventilation	525
Ventilating and Heating Plant, for Large High School, Suggestions for Operating.....	575
Yellow Pine and Douglas Fir Beams, Table of Strength.....	521
Zoning Ordinance, City of Chicago.....	331

WELCH

LABORATORY, VOCATIONAL and Library Furniture and Equipment for Schools, Hospitals, Libraries and Industrials



No. 2100 Chemistry Desk

Manufacturing Facilities

THE making of dependable laboratory furniture requires not only an experienced engineering organization, skilled workmanship, and the use of good materials, but an intelligent combination of these things. In specifying Welch laboratory furniture made in Manitowoc, you are guaranteed this combination—you are assured of substantially built equipment that is long lived, even under the most severe use and treatment.

We have been manufacturing laboratory furniture for a number of years and in April 1928 we took over the Wiese Laboratory Furniture Company of Manitowoc, Wisconsin, whose reputation for the highest quality is universally known.

Our Factories

OUR factory is at Manitowoc, Wisconsin. This insures excellent shipping facilities over two railways and four steamship lines. Its location, which is in the heart of the woodworking districts, affords us a plentiful supply of highly skilled cabinet makers, finishers and other artisans. Our plant is arranged and equipped with the most modern machinery necessary to manufacture laboratory furniture quickly and economically. Visitors are always welcome at the factory.

OUR scientific apparatus factory is located in Chicago, where we have ready access to an unlimited supply of raw materials and highly skilled mechanics. Each department is under the supervision of men with long experience in the manufacture of scientific apparatus. It is equipped with up-to-date machinery, essential in manufacturing scientific apparatus of the highest quality.

Service Department

TRAINED engineers and designers of many years' experience are available to contractors, architects and buyers, for consulting and advising services in reference to laboratory equipment without charge or obligation. This includes suggestive layout plans showing the various pieces of laboratory furniture, together with the roughing-in points for all plumbing, electricity, gas, etc., as required for the various equipment specified.

Architects and buyers are relieved of all of the details incident to planning and arranging the various departments that we equip. Our planning and installation department carries work through to completion covering the actual installation and the giving of engineering service and inspection even after the work is completed.

Catalog F

A COPY of our 1928-29 edition of Catalog F should be in the hands of everyone interested in Laboratory, Vocational and Library Furniture. It will be sent promptly, prepaid, upon request. In it you will find a complete line of laboratory furniture for your various departments, giving in concise terms the exact construction of each piece. The many illustrations will give you a clear idea of the completed furniture.

Catalog G

OUR Catalog G illustrates and lists a most complete line of Physical and Chemical Apparatus. Laboratory men will find our Catalogs B, C and G very helpful in making up their lists of equipment.

W. M. Welch Manufacturing Company

*Manufacturers of School and Industrial Laboratory Furniture and Equipment
Sales Representatives in the Principal Cities*

Laboratory Furniture Factory: Manitowoc, Wisconsin, U. S. A.

General Offices and Warehouse: 1516 Orleans St., Chicago, U. S. A.

'MODERN' STOKER

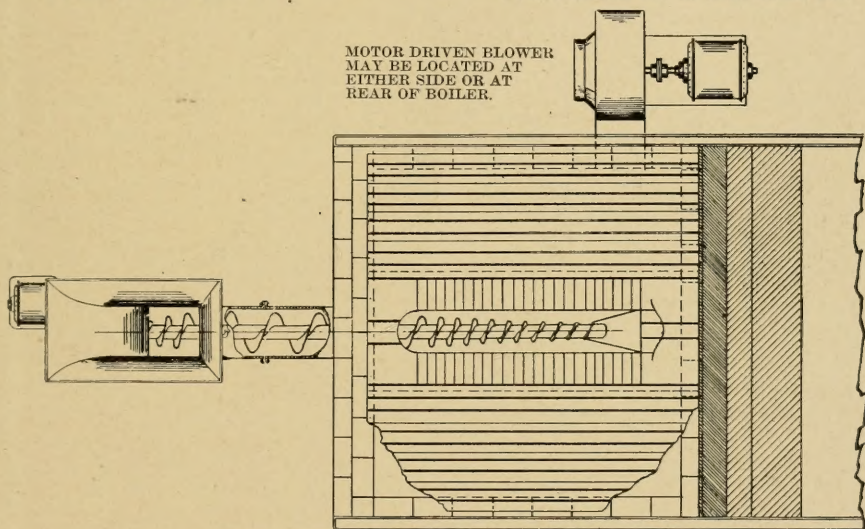
Pays for itself in one to three years
by savings in fuel costs.

Designed and Guaranteed
to burn Illinois Screenings efficiently.
Complies with all smoke ordinances.
Many unique and exclusive features.

Satisfied Users:

ART INSTITUTE
AMERICAN CAN CO.
MONROE BUILDING
LIBBY, McNEILL & LIBBY
RAVENSWOOD HOSPITAL
WASH RITE LAUNDRY CO.
SHERIDAN TRUST & SAVINGS BANK BLDG.
TROY LAUNDRY MACHINERY CO.
TRUSTEES SYSTEM BLDG.
NEW LAWRENCE HOTEL
ROME CO., INC.
SOUTH SHORE CLUB APT. HOTEL
WINDSOR LAUNDRIES, INC.

ROCHELLE HIGH SCHOOL
FERGUSON COAL CO.
HOLY NAME CATHEDRAL
STADIUM GARAGE
VAUGHAN SEED CO.
GARY STATE BANK
NORTH HILLS COUNTRY CLUB
OLD PEOPLES HOME
ILLINOIS BELL TELEPHONE CO.
12TH STREET STORE
BUDLONG PICKLE CO.
AMERICAN SYRUP & SORGHUM CO.
PUB. SERVICE CO. OF NORTHERN ILL.



STOKERS CAN NOW BE INSTALLED ON THE LEASE PLAN.

A WRITTEN OR TELEPHONE REQUEST WILL BRING ONE OF OUR
ENGINEERS WITH FULL DATA FOR YOUR USE

MODERN COAL BURNER CO.

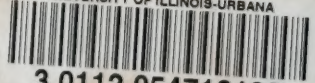
(Subsidiary Peabody Coal Co.)

20 North Wacker Drive

Phone Franklin 6316

CHICAGO

UNIVERSITY OF ILLINOIS-URBANA



3 0112 054719122